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THE UNITED STATES ALMANAC;

OR

Complete Ephemeris,

FOR THE YEAR

1845;

CONTAINING

THE LENGTH AND INCREASE OF DAYS, AND THE SUN'S RISING AND SETTING, &c., GIVEN FOR SEVEN DIFFERENT PARALLELS OF LATITUDE, EMBRACING THE WHOLE EXTENT OF THE UNION;

COMPLETE

EPHEMERIDES OF THE SUN AND MOON;

LUNAR DISTANCES;

A COLLECTION OF

SUCH TABLES AS ARE IN MOST FREQUENT USE

AMONG ASTRONOMERS, NAVIGATORS, ENGINEERS, AND OTHERS,

FOR THE DETERMINATION OF LATITUDE, TIME, &c.;

BY JOHN DOWNES,

MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY, AND LATE OF THE NORTH-EASTERN BOUNDARY SURVEY:

ALSO,

NUMEROUS STATISTICS,

RELATIVE TO COMMERCE, AGRICULTURE, MANUFACTURES, THE GENERAL AND STATE GOVERNMENTS, PUBLIC OFFICERS, WITH THEIR SALARIES, ETC.

BY JOHN PHILIPS MONTGOMERY, Esq.,

MEMBER OF THE PHILADELPHIA BAR.

PHILADELPHIA:

B. WALKER, 20 SOUTH FOURTH STREET.

NEW YORK: C. J. GILLIS.

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1845.

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PREFACE

TO THE

ASTRONOMICAL DEPARTMENT.

The third volume of the United States Almanac is offered to the public, with several additions, which, it is hoped, will render it more extensively useful. The Ephemeris of the Sun, Moon, Planets, and Fixed Stars, has, as heretofore, been taken from the Nautical Almanac, with such modifications as were necessary to suit the difference of meridians. In compliance with the request of several masters of vessels, Lunar Distances from the Sun, Planets, and Fixed Stars, have been added, with a model for working a Lunar, on the basis of Encke's method in the *Berliner Jahrbuch* for 1842. A brief model for the computation of a Solar Eclipse, by Bessel's method, is appended. Several subsidiary tables not contained in the former volumes will also be found. Among the interesting astronomical events of the year 1845, may be mentioned the Partial Eclipse of the Sun on the 6th of May, of which the end only will be visible in the North Eastern States, and Upper and Lower Canada, though all the phases will be seen in Europe.

The Transit of Mercury, on the 8th of May, will be visible both at Ingress and Egress, in all North America and the greater part of South America.

There will be about one hundred and fifty Occultations of Fixed Stars by the Moon, which, on account of their great importance, it is hoped will be extensively observed. As an illustration of the importance of this class of phenomena, it may be re-

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marked, that the late Mr. Nicollet having in his travels observed an occultation of one of the Pleiades, on the 6th of July, 1839, at his encampment on the "Coteau du Missouri," found on his return that the same event had been observed at the Hudson, Washington, and Philadelphia observatories. This fortunate coincidence enabled that distinguished astronomer to fix with extreme precision the geographical position of one of the cardinal points of his map of the Iowa Territory. Encke's Comet will return to its perihelion during the summer. No Ephemeris has yet been received from Europe. Its returns to its perihelion in this season of the year have hitherto been unfavourable for observation.

Acknowledgments are due to Professor Stephen Alexander, of Princeton College, N. J., who has kindly examined extra sheets of the work, and pointed out several oversights, which have been corrected in the stereotype plates previous to striking off the first edition, as well as for other important suggestions relative to the general arrangement of the tables.

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PREFACE

BY THE STATISTICAL EDITOR.

At the request of the gentleman who has in charge the publication of the "United States Almanac for 1845," the undersigned has assumed the supervision of the Statistical department of that periodical; and has endeavoured to exhibit, with as much accuracy as is attainable in a work comprising such a variety of topics, the civil and physical resources developed by this great nation in her rapid advance towards the summit of prosperity.

It is, of course, impracticable to give all the details contained in the voluminous documents and other sources of information which have been consulted; but it is confidently hoped that the summary now presented will be found to include the prominent subjects of general inquiry.

The *Lists of Officers of the General Government* have, it will be perceived, been corrected at Washington; and the undersigned avails himself of this opportunity to express his sense of the politeness with which his wishes on this subject were facilitated by the gentlemen who preside over the various Executive Departments.

In the list of *Members of Congress*, it has been deemed advisable to place the names of the counties comprising each Congressional District in immediate connexion with the name of its Representative, instead of arranging them under the head of "Individual States."

Under the heads of *Population*, *Products*, *Manufactures*, *Revenue*, and *Public Lands*, will be found several valuable tables derived from official sources. The report of the Secretary of the Treasury on the *Commerce* and *Navigation* of the United States, is a volume of 440 pages, and the requisite condensation which has been made, will, it is hoped, afford ample information on this important topic.

During the past year, the public attention has been so much engrossed by the *Electro-Magnetic Telegraph* of Professor Morse, and its wonderful results in annihilating time and space, that a description of the nature and operation of this great effort of human ingenuity has

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appeared to the Statistical Editor peculiarly appropriate for this periodical.

The *Regulations for the Coast Survey* will also prove interesting to the scientific and general reader.

After the first part of the work had passed through the press, the Statistics of the various *Religious Denominations in the United States* were kindly furnished by a gentleman whose ability and means of information are such as to ensure all possible accuracy in the performance of the duties which he has undertaken; no alteration whatever has, therefore, been made by the undersigned in the arrangement or details of the data thus furnished.

The last part of the volume, relating to the *individual States and Territories*, has been modified from the corresponding part of the last number of the Almanac.

The sketches of the Constitutions of the States have been revised; additions have been made to the lists of officers; and the particular statistics; and the details in regard to the Territories and the District of Columbia have also been subjoined.

JOHN PHILIPS MONTGOMERY.

Philadelphia, September 12, 1844.

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PRINCIPAL ARTICLES OF THE CALENDAR, FOR THE YEAR 1845.

Golden Number	3	Dominical Letter	E
Epact	22	Roman Indiction	3
Solar Cycle	6	Julian Period	6558

FIXED AND MOVEABLE FESTIVALS, &c. &c.

Epiphany	Jan.	6	St. George	Apr.	23
Septuagessima Sunday	"	19	*Rogation Sunday*	"	27
Quinquagessima—Shrove Sunday	Feb.	2	*Ascension Day—Holy Thursday*	May	1
Ash Wednesday	"	5	*Pentecost—Whit Sunday*	"	11
Quadragessima—1st Sunday in Lent	"	9	*Trinity Sunday*	"	18
St. David	Mar.	1	Corpus Christi	"	22
Palm Sunday	"	16	St. John Baptist—Midsummer Day	"	24
St. Patrick	"	17	St. Michael—Michaelmas Day	Sept.	29
Good Friday	"	21	St. Andrew	Nov.	30
Easter Sunday	"	23	*1st Sunday in Advent*	"	30
Annunciation—Lady Day	"	25	St. Thomas	Dec.	21
Low Sunday	"	30	Christmas	"	25

The 70th year of American Independence commences on July 4, 1845.
The 5606th of the Jewish Era commences on October 2, 1845.
According to Varro, the year 1845 is the 2598th since the foundation of Rome.
The year 1261 of the Mohammedan Era commences on January 10, 1845.
Ramadân (Month of Abstinence observed by the Turks) commences on Sept. 3, 1845.

EXPLANATION OF ASTRONOMICAL SYMBOLS.

☉ The Sun. ☾ The Moon. ☿ Mercury. ⊕ The Earth.
♀ Venus. ♂ Mars. ⚶ Vesta.
⚵ Juno. ⚴ Pallas. ⚳ Ceres.
♃ Jupiter. ♄ Saturn. ♅ Uranus.

☌ Conjunction—having the same Longitude or Right Ascension.
□ Quadrature—differing 90° in Longitude, or 6 hours in Right Ascension.
☍ Opposition—differing 180° in Longitude, or 12 hours in Right Ascension, or in opposite points of the Sphere with respect to Longitude or Right Ascension.
☊ Ascending Node. ☋ Descending Node.

SIGNS OF THE ZODIAC.

♈ Aries	*The Ram.*	♌ Leo	*The Lion.*	♐ Sagittarius	*The Archer.*
♉ Taurus	*The Bull.*	♍ Virgo	*The Virgin.*	♑ Capricornus	*The Goat.*
♊ Gemini	*The Twins.*	♎ Libra	*The Balance.*	♒ Aquarius	*The Waterman.*
♋ Cancer	*The Crab.*	♏ Scorpio	*The Scorpion.*	♓ Pisces	*The Fishes.*

SEASONS.

		d.	h.	m.	
Sun enters ♈, Spring commences	March	20	0	37 a.	Washington Mean Time.
Sun enters ♋, Summer commences	June	21	9	35 m.	
Sun enters ♎, Autumn commences	September	22	11	45 a.	
Sun enters ♑, Winter commences	December	21	5	18 a.	

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville SUN Rises.	Raleigh. Nashville SUN Sets.	Ch'ston. Savann'h SUN Rises.	Ch'ston. Savann'h SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Wed.	7 36	4 32	7 30	4 38	7 24	4 44	7 19	4 49	7 10	4 58	7 4	5 4	6 57	5 11
2	Thur.	7 36	4 33	7 30	4 39	7 24	4 45	7 19	4 50	7 10	4 59	7 4	5 5	6 57	5 12
3	Frid.	7 36	4 34	7 30	4 40	7 24	4 46	7 19	4 51	7 10	5 0	7 4	5 6	6 57	5 12
4	Sat.	7 36	4 35	7 30	4 41	7 24	4 47	7 19	4 52	7 10	5 1	7 4	5 7	6 58	5 13
5	*SUN.*	7 36	4 36	7 30	4 42	7 24	4 48	7 19	4 53	7 10	5 2	7 4	5 8	6 58	5 14
6	Mond.	7 36	4 37	7 30	4 43	7 24	4 49	7 19	4 54	7 10	5 2	7 4	5 8	6 58	5 14
7	Tues.	7 35	4 38	7 30	4 44	7 24	4 50	7 19	4 55	7 10	5 3	7 4	5 9	6 58	5 15
8	Wed.	7 35	4 39	7 30	4 45	7 24	4 51	7 19	4 56	7 10	5 4	7 4	5 10	6 58	5 16
9	Thur.	7 35	4 40	7 30	4 46	7 24	4 52	7 19	4 57	7 10	5 5	7 4	5 11	6 58	5 17
10	Frid.	7 35	4 41	7 29	4 47	7 24	4 53	7 19	4 58	7 10	5 6	7 4	5 12	6 58	5 18
11	Sat.	7 34	4 42	7 29	4 48	7 23	4 54	7 18	4 59	7 10	5 7	7 4	5 12	6 58	5 18
12	*SUN.*	7 34	4 43	7 29	4 49	7 23	4 55	7 18	5 0	7 9	5 8	7 4	5 13	6 58	5 19
13	Mond.	7 34	4 45	7 28	4 50	7 23	4 56	7 18	5 1	7 9	5 9	7 4	5 14	6 58	5 20
14	Tues.	7 33	4 46	7 28	4 51	7 22	4 57	7 17	5 2	7 9	5 10	7 4	5 15	6 58	5 21
15	Wed.	7 33	4 47	7 27	4 53	7 22	4 58	7 17	5 3	7 8	5 11	7 3	5 16	6 57	5 22
16	Thur.	7 32	4 48	7 27	4 54	7 22	4 59	7 17	5 4	7 8	5 12	7 3	5 17	6 57	5 23
17	Frid.	7 31	4 50	7 26	4 55	7 21	5 0	7 16	5 5	7 8	5 13	7 3	5 18	6 57	5 23
18	Sat.	7 31	4 51	7 26	4 56	7 21	5 1	7 16	5 6	7 7	5 14	7 2	5 19	6 57	5 24
19	*SUN.*	7 30	4 52	7 25	4 58	7 20	5 3	7 15	5 7	7 7	5 15		2 5 20	6 57	5 25
20	Mond.	7 29	4 53	7 24	4 59	7 19	5 4	7 14	5 8	7 7	5 16	7 2	5 21	6 56	5 26
21	Tues.	7 29	4 55	7 23	5 0	7 18	5 5	7 14	5 9	7 6	5 17	7 1	5 22	6 56	5 27
22	Wed.	7 28	4 56	7 22	5 1	7 18	5 6	7 13	5 10	7 6	5 18	7 1	5 23	6 56	5 28
23	Thur.	7 27	4 57	7 22	5 3	7 17	5 8	7 12	5 12	7 5	5 19	7 0	5 24	6 55	5 29
24	Frid.	7 26	4 59	7 21	5 4	7 16	5 9	7 12	5 13	7 5	5 20	7 0	5 25	6 55	5 30
25	Sat.	7 25	5 0	7 20	5 5	7 15	5 10	7 11	5 14	7 4	5 21	7 0	5 26	6 55	5 31
26	*SUN.*	7 24	5 1	7 20	5 6	7 15	5 11	7 10	5 15	7 4	5 22	6 59	5 27	6 54	5 32
27	Mond.	7 23	5 3	7 19	5 7	7 14	5 12	7 10	5 16	7 3	5 23	6 59	5 28	6 54	5 33
28	Tues.	7 22	5 4	7 18	5 9	7 13	5 13	7 9	5 17	7 2	5 24	6 58	5 29	6 53	5 34
29	Wed.	7 21	5 6	7 17	5 10	7 12	5 15	7 8	5 19	7 2	5 25	6 58	5 30	6 53	5 35
30	Thur.	7 20	5 7	7 16	5 11	7 12	5 16	7 8	5 20	7 1	5 26	6 57	5 31	6 52	5 36
31	Frid.	7 19	5 8	7 15	5 13	7 11	5 17	7 7	5 21	7 0	5 27	6 56	5 32	6 52	5 37

Length and Increase of Days.

Day of the Month.	Augusta. Portland. Length.	Augusta. Portland. Incr.	Boston. Albany. Length.	Boston. Albany. Incr.	New York. Philadelphia. Length.	New York. Philadelphia. Incr.	Washington. Baltimore. Length.	Washington. Baltimore. Incr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Incr.	Charleston. Savannah. Length.	Charleston. Savannah. Incr.	New Orleans. Mobile. Length.	New Orleans. Mobile. Incr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	8 56	0 4	9 18	0 5	9 20	0 4	9 30	0 4	9 49	0 4	10 2	0 2	10 14	0 1
3	8 58	0 6	9 20	0 6	9 22	0 5	9 31	0 5	9 50	0 5	10 3	0 3	10 15	0 2
5	9 0	0 9	9 21	0 8	9 23	0 7	9 33	0 6	9 52	0 7	10 4	0 4	10 16	0 3
7	9 2	0 11	9 23	0 10	9 25	0 9	9 35	0 8	9 53	0 9	10 5	0 5	10 17	0 4
9	9 5	0 14	9 25	0 12	9 27	0 11	9 37	0 10	9 55	0 11	10 7	0 7	10 19	0 6
11	9 8	0 17	9 28	0 15	9 30	0 14	9 40	0 13	9 57	0 13	10 9	0 9	10 21	0 8
13	9 11	0 20	9 31	0 17	9 33	0 16	9 42	0 15	10 0	0 15	10 11	0 11	10 23	0 10
15	9 15	0 23	9 34	0 20	9 36	0 19	9 45	0 18	10 2	0 17	10 13	0 13	10 25	0 12
17	9 18	0 27	9 38	0 23	9 39	0 22	9 48	0 21	10 5	0 20	10 16	0 15	10 27	0 14
19	9 22	0 31	9 42	0 27	9 43	0 26	9 52	0 25	10 8	0 23	10 18	0 17	10 29	0 16
21	9 26	0 35	9 45	0 30	9 46	0 29	9 55	0 28	10 11	0 26	10 21	0 20	10 31	0 18
23	9 31	0 39	9 49	0 34	9 50	0 32	9 59	0 32	10 14	0 29	10 23	0 22	10 33	0 20
25	9 35	0 44	9 53	0 38	9 54	0 36	10 2	0 35	10 17	0 32	10 26	0 24	10 35	0 22
27	9 40	0 48	9 57	0 42	9 58	0 40	10 5	0 38	10 20	0 35	10 29	0 27	10 38	0 25
29	9 44	0 53	10 1	0 46	10 2	0 44	10 9	0 42	10 24	0 39	10 32	0 30	10 41	0 28
31	9 49	0 59	10 5	0 50	10 6	0 48	10 13	0 46	10 27	0 42	10 36	0 34	10 45	0 32

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JANUARY.

Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Rises.	Boston Albany. Rises.	N. York. Philada. Rises.	Was'ton. Bal'more. Rises	Raleigh. Nash'lle. Rises.	Cha'ston. Savannah. Rises.	N. Orl'ns. Mobile. Rises.	Moon south Washington.	Sidereal Time of Sun's Semidiam. passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Wed.	morn	morn	morn	morn	morn	morn	morn	5 41 m	1 10.98	1	.000
2	Thur.	1 2	0 59	0 57	0 54	0 52	0 49	0 47	6 31	1 10.93	2	.003
3	Frid.	2 13	2 9	2 5	2 2	1 58	1 54	1 50	7 24	1 10.88	3	.005
4	Sat.	3 26	3 21	3 16	3 11	3 6	3 1	2 56	8 22	1 10.82	4	.008
5	*SUN.*	4 37	4 32	4 26	4 20	4 14	4 8	4 2	9 22	1 10.76	5	.011
6	Mon.	5 44	5 38	5 32	5 26	5 19	5 13	5 7	10 25	1 10.70	6	.014
7	Tues.	sets	sets	sets	sets	sets	sets	sets	11 29	1 10.63	7	.016
8	Wed.	5 34 a	5 40 a	5 45a	5 20 a	5 56 a	6 1 a	6 7 a	0 30 a	1 10.56	8	.019
9	Thur.	6 49	6 54	6 58	7 2	7 6	7 10	7 14	1 27	1 10.49	9	.022
10	Frid.	8 2	8 5	8 8	8 11	8 13	8 16	8 19	2 23	1 10.41	10	.025
11	Sat.	9 15	9 16	9 17	9 18	9 19	9 20	9 21	3 11	1 10.33	11	.027
12	*SUN.*	10 23	10 23	10 23	10 22	10 22	10 21	10 21	3 59	1 10.25	12	.030
13	Mon.	11 28	11 26	11 25	11 23	11 21	11 20	11 18	4 45	1 10.16	13	.033
14	Tues.	morn	morn	morn	morn	morn	morn	morn	5 31	1 10.07	14	.036
15	Wed.	0 32	0 29	0 26	0 23	0 20	0 17	0 14	6 16	1 9.98	15	.038
16	Thur.	1 34	1 30	1 26	1 22	1 18	1 14	1 10	7 3	1 9.89	16	.041
17	Frid.	2 34	2 29	2 24	2 19	2 14	2 8	2 3	7 50	1 9.79	17	.044
18	Sat.	3 31	3 25	3 19	3 13	3 8	3 2	2 56	8 38	1 9.69	18	.047
19	*SUN.*	4 23	4 17	4 11	4 5	3 59	3 53	3 47	9 26	1 9.59	19	.049
20	Mon.	5 11	5 5	4 59	4 53	4 47	4 41	4 45	10 14	1 9.49	20	.052
21	Tues.	5 54	5 49	5 43	5 37	5 32	5 26	5 20	11 3	1 9.39	21	.055
22	Wed.	6 32	6 27	6 22	6 17	6 12	6 7	6 2	11 50	1 9.29	22	.058
23	Thur.	rises	rises	rises	rises	rises	rises	rises	morn	1 9.18	23	.060
24	Frid.	6 30 a	6 33 a	6 36a	6 39 a	6 43 a	6 46 a	6 49 a	0 37	1 9.07	24	.063
25	Sat.	7 33	7 35	7 37	7 39	7 41	7 43	7 45	1 22	1 8.96	25	.066
26	*SUN.*	8 38	8 39	8 39	8 40	8 41	8 42	8 42	2 7	1 8.85	26	.068
27	Mon.	9 45	9 44	9 43	9 43	9 42	9 41	9 40	2 53	1 8.74	27	.071
28	Tues.	10 52	10 50	10 48	10 46	10 44	10 42	10 40	3 39	1 8.63	28	.074
29	Wed.	morn	11 58	11 55	11 51	11 48	11 44	11 41	4 28	1 8.51	29	.077
30	Thur.	0 1	morn	morn	morn	morn	morn	morn	5 19	1 8.40	30	.079
31	Frid.	1 12	1 7	1 2	0 58	0 53	0 49	0 44	6 13	1 8.28	31	.082

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d.	h.	m.		d.	h.	m.		d.	h.	
Last Quarter ..	1	10	13 m.	Full Moon	24	9	12 m.	Perigee	7	0	m.
New Moon	8	2	5 m.	*Last Quarter* ..	30	8	47 a.	Apogee	19	5	m.
First Quarter .	15	3	43 m.								

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Augusta. Portland. Ends	Boston. Albany. Begins	Boston. Albany. Ends	New York. Philadelphia. Begins	New York. Philadelphia. Ends	Washington. Baltimore. Begins	Washington. Baltimore. Ends	Raleigh. Nashville. Begins	Raleigh. Nashville. Ends	Charleston. Savannah. Begins	Charleston. Savannah. Ends	New Orleans. Mobile. Begins	New Orleans. Mobile. Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	5 52	6 16	5 48	6 20	5 46	6 22	5 43	6 25	5 39	6 29	5 35	6 33	5 31	6 37
6	5 52	6 21	5 48	6 24	5 46	6 26	5 44	6 28	5 40	6 32	5 37	6 35	5 33	6 39
11	5 51	6 26	5 48	6 29	5 47	6 30	5 45	6 32	5 41	6 36	5 37	6 39	5 34	6 42
16	5 50	6 31	5 48	6 33	5 46	6 34	5 44	6 36	5 41	6 40	5 38	6 43	5 34	6 47
21	5 47	6 36	5 48	6 37	5 44	6 39	5 43	6 41	5 40	6 44	5 37	6 47	5 33	6 51
26	5 44	6 42	5 45	6 43	5 42	6 44	5 40	6 46	5 37	6 49	5 35	6 51	5 32	6 54
31	5 40	6 48	5 39	6 49	5 38	6 50	5 37	6 52	5 34	6 54	5 32	6 56	5 30	6 58

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FEBRUARY. [1845.

Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville SUN Rises.	Raleigh. Nashville SUN Sets.	Ch'ston. Savann'h SUN Rises.	Ch'ston. Savann'h SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Sat.	7 18	5 10	7 14	5 14	7 10	5 18	7 6	5 22	7 0	5 28	6 56	5 32	6 51	5 37
2	*SUN.*	7 17	5 11	7 13	5 15	7 9	5 19	7 5	5 23	6 59	5 29	6 55	5 33	6 50	5 38
3	Mond.	7 16	5 13	7 11	5 16	7 7	5 20	7 4	5 24	6 58	5 30	6 54	5 34	6 49	5 39
4	Tues.	7 14	5 14	7 10	5 18	7 6	5 22	7 3	5 25	6 57	5 32	6 53	5 35	6 49	5 40
5	Wed.	7 13	5 16	7 9	5 19	7 5	5 23	7 2	5 26	6 56	5 33	6 52	5 36	6 48	5 41
6	Thur.	7 12	5 17	7 8	5 20	7 4	5 24	7 1	5 27	6 55	5 34	6 51	5 37	6 47	5 42
7	Frid.	7 11	5 18	7 7	5 22	7 3	5 25	7 0	5 28	6 54	5 35	6 50	5 38	6 46	5 43
8	Sat.	7 9	5 19	7 6	5 23	7 2	5 26	6 59	5 29	6 53	5 36	6 49	5 39	6 45	5 43
9	*SUN.*	7 8	5 21	7 5	5 25	7 1	5 28	6 58	5 31	6 52	5 37	6 48	5 40	6 44	5 44
10	Mond.	7 7	5 22	7 4	5 26	7 0	5 29	6 57	5 32	6 51	5 38	6 47	5 41	6 43	5 45
11	Tues.	7 5	5 24	7 2	5 27	6 59	5 30	6 56	5 33	6 50	5 39	6 46	5 42	6 42	5 46
12	Wed.	7 4	5 25	7 1	5 29	6 58	5 31	6 55	5 34	6 49	5 40	6 45	5 43	6 42	5 47
13	Thur.	7 2	5 27	7 0	5 30	6 57	5 32	6 54	5 35	6 48	5 41	6 45	5 44	6 41	5 47
14	Frid.	7 1	5 28	6 58	5 31	6 56	5 33	6 53	5 36	6 47	5 42	6 44	5 45	6 40	5 48
15	Sat.	7 0	5 29	6 57	5 33	6 54	5 34	6 52	5 38	6 46	5 43	6 43	5 46	6 39	5 49
16	*SUN.*	6 58	5 31	6 55	5 34	6 53	5 36	6 50	5 39	6 45	5 44	6 42	5 46	6 38	5 49
17	Mond.	6 56	5 32	6 54	5 35	6 51	5 37	6 49	5 40	6 44	5 45	6 41	5 47	6 37	5 50
18	Tues.	6 55	5 33	6 52	5 36	6 50	5 38	6 48	5 41	6 43	5 46	6 40	5 48	6 36	5 51
19	Wed.	6 53	5 35	6 51	5 38	6 49	5 40	6 47	5 42	6 42	5 47	6 39	5 49	6 36	5 52
20	Thur.	6 52	5 36	6 50	5 39	6 48	5 41	6 46	5 43	6 40	5 47	6 38	5 50	6 35	5 52
21	Frid.	6 50	5 37	6 48	5 41	6 46	5 43	6 44	5 45	6 39	5 48	6 37	5 50	6 34	5 53
22	Sat.	6 49	5 39	6 47	5 42	6 45	5 44	6 43	5 46	6 38	5 49	6 36	5 51	6 33	5 54
23	*SUN.*	6 47	5 40	6 45	5 43	6 43	5 45	6 41	5 47	6 37	5 50	6 35	5 52	6 32	5 55
24	Mond.	6 45	5 42	6 44	5 45	6 42	5 47	6 40	5 48	6 36	5 51	6 34	5 53	6 31	5 55
25	Tues.	6 44	5 43	6 42	5 46	6 40	5 48	6 38	5 49	6 34	5 52	6 32	5 54	6 30	5 56
26	Wed.	6 42	5 44	6 40	5 47	6 38	5 49	6 37	5 50	6 33	5 53	6 31	5 54	6 29	5 56
27	Thur.	6 40	5 46	6 38	5 48	6 37	5 50	6 35	5 51	6 32	5 54	6 30	5 55	6 28	5 57
28	Frid.	6 39	5 47	6 37	5 49	6 35	5 51	6 34	5 52	6 30	5 55	6 29	5 56	6 27	5 58

Length and Increase of Days.

Day of the Month.	Augusta. Portland. Length.	Augusta. Portland. Incr.	Boston. Albany. Length.	Boston. Albany. Incr.	New York. Philadelphia. Length.	New York. Philadelphia. Incr.	Washington. Baltimore. Length.	Washington. Baltimore. Incr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Incr.	Charleston. Savannah. Length.	Charleston. Savannah. Incr.	New Orleans. Mobile. Length.	New Orleans. Mobile. Incr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	9 52	1 0	10 0	0 56	10 8	0 51	10 16	0 50	10 29	0 44	10 37	0 39	10 46	0 34
3	9 57	1 6	10 5	1 1	10 13	0 56	10 20	0 54	10 33	0 48	10 41	0 43	10 50	0 38
5	10 2	1 12	10 10	1 6	10 17	1 0	10 24	0 58	10 36	0 52	10 44	0 46	10 53	0 41
7	10 8	1 16	10 16	1 11	10 22	1 5	10 28	1 2	10 40	0 55	10 48	0 50	10 57	0 45
9	10 13	1 22	10 20	1 16	10 26	1 9	10 32	1 6	10 44	0 59	10 52	0 54	11 0	0 48
11	10 19	1 27	10 25	1 21	10 30	1 13	10 36	1 10	10 48	1 3	10 56	0 58	11 4	0 52
13	10 24	1 33	10 30	1 26	10 35	1 18	10 41	1 15	10 52	1 7	11 0	1 2	11 7	0 55
15	10 30	1 39	10 35	1 31	10 40	1 23	10 45	1 19	10 56	1 12	11 3	1 5	11 10	0 58
17	10 36	1 44	10 40	1 36	10 45	1 28	10 50	1 24	11 1	1 16	11 7	1 9	11 13	1 1
19	10 41	1 50	10 46	1 42	10 50	1 33	10 54	1 28	11 5	1 20	11 10	1 12	11 16	1 4
21	10 47	1 56	10 52	1 48	10 55	1 38	10 59	1 33	11 9	1 24	11 14	1 16	11 19	1 7
23	10 53	2 2	10 57	1 53	11 0	1 43	10 3	1 37	11 14	1 29	11 18	1 20	11 23	1 11
25	10 59	2 8	11 3	1 39	11 5	1 48	10 7	1 41	11 18	1 33	11 22	1 24	11 26	1 14
27	11 5	2 14	11 8	2 4	11 10	1 53	10 12	1 46	11 22	1 38	11 25	1 27	11 29	1 17
28	11 8	2 17	11 10	2 6	11 12	1 55	10 14	1 48	11 24	1 39	11 27	1 28	11 33	1 21

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Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Rises.	Boston. Albany. Rises.	N. York. Philada. Rises.	Was'ton. Bal'more. Rises	Raleigh. Nash'ille. Rises.	Cha'ston. Savannah. Rises.	N. Orl'ns. Mobile. Rises.	Moon south Washington.	Sidereal Time of Sun's Semidiam. passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Sat.	2 21 m	2 16m	2 10m	2 4m	1 59m	1 53m	1 48m	7 10m	1 8.17	32	.085
2	*SUN.*	3 27	3 21	3 15	3 9	3 3	2 57	2 51	8 10	1 8.05	33	.088
3	Mon.	4 27	4 21	4 15	4 9	4 4	3 58	3 52	9 10	1 7.93	34	.090
4	Tues.	5 20	5 15	5 10	5 4	4 59	4 53	4 48	10 11	1 7.82	35	.093
5	Wed.	6 5	6 0	5 56	5 51	5 47	5 42	5 37	11 10	1 7.70	36	.096
6	Thur.	sets	sets	sets	sets	sets	sets	sets	0 5a	1 7.59	37	.099
7	Frid.	6 56a	6 57a	6 58a	6 59a	7 0a	7 1a	7 2a	0 57	1 7.47	38	.101
8	Sat.	8 1	8 1	8 2	8 2	8 2	8 3	8 3	1 48	1 7.36	39	.104
9	*SUN.*	9 7	9 7	9 6	9 5	9 4	9 3	9 2	2 36	1 7.25	40	.107
10	Mon.	10 16	10 13	10 11	10 9	10 6	10 4	10 1	3 23	1 7.14	41	.110
11	Tues.	11 19	11 16	11 12	11 9	11 5	11 2	10 58	4 9	1 7.03	42	.112
12	Wed.	morn	morn	morn	morn	morn	11 58	11 53	4 56	1 6.92	43	.115
13	Thur.	0 21	0 17	0 12	0 7	0 3	morn	morn	5 44	1 6.81	44	.118
14	Frid.	1 20	1 15	1 9	1 4	0 58	0 53	0 47	6 32	1 6.71	45	.120
15	Sat.	2 15	2 9	2 3	1 57	1 51	1 45	1 39	7 20	1 6.60	46	.123
16	*SUN.*	3 5	2 59	2 53	2 47	2 41	2 35	2 28	8 8	1 6.50	47	.126
17	Mon.	3 50	3 44	3 38	3 32	3 27	3 21	3 15	8 56	1 6.40	48	.129
18	Tues.	4 30	4 25	4 19	4 14	4 9	4 3	3 58	9 44	1 6.30	49	.131
19	Wed.	5 6	5 1	4 57	4 52	4 48	4 43	4 39	10 31	1 6.20	50	.134
20	Thur.	5 37	5 34	5 31	5 27	5 24	5 20	5 17	11 18	1 6.11	51	.137
21	Frid.	rises	rises	rises	rises	rises	rises	rises	morn	1 6.01	52	.140
22	Sat.	6 28a	6 29a	6 30a	6 31a	6 32a	6 34a	6 35a	0 4	1 5.92	53	.142
23	*SUN.*	7 35	7 34	7 34	7 34	7 34	7 34	7 33	0 50	1 5.83	54	.145
24	Mon.	8 43	8 41	8 39	8 38	8 36	8 35	8 33	1 37	1 5.75	55	.148
25	Tues.	9 52	9 49	9 46	9 43	9 41	9 38	9 35	2 25	1 5.66	56	.151
26	Wed.	11 3	10 59	10 54	10 50	10 46	10 42	10 38	3 16	1 5.58	57	.153
27	Thur.	morn	morn	morn	11 57	11 51	11 46	11 41	4 9	1 5.50	58	.156
28	Frid.	0 12	0 7	0 2	13 1	12 55	12 49	12 43	5 5	1 5.42	59	.159

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d. h. m.		d. h. m.		d. h.
New Moon....	6 1 27 a.	Full Moon	22 1 38 m.	Perigee	4 6 m.
First Quarter .	13 11 52 a.	*Last Quarter* ..	29 5 5 m.	Apogee	15 11 a.

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Augusta. Portland. Ends	Boston. Albany. Begins	Boston. Albany. Ends	New York. Philadelphia. Begins	New York. Philadelphia. Ends	Washington. Baltimore. Begins	Washington. Baltimore. Ends	Raleigh. Nashville. Begins	Raleigh. Nashville. Ends	Charleston. Savannah. Begins	Charleston. Savannah. Ends	New Orleans. Mobile. Begins	New Orleans. Mobile. Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	5 39	6 49	5 38	6 50	5 37	6 51	5 36	6 52	5 33	6 55	5 31	6 57	5 29	6 59
6	5 33	6 55	5 33	6 55	5 33	6 56	5 31	6 58	5 30	7 0	5 28	7 1	5 25	7 3
11	5 27	7 2	5 28	7 1	5 28	7 1	5 26	7 1	5 25	7 3	5 24	7 5	5 22	7 7
16	5 21	7 8	5 22	7 7	5 21	7 7	5 21	7 7	5 20	7 8	5 20	7 8	5 18	7 10
21	5 14	7 14	5 15	7 13	5 15	7 13	5 15	7 12	5 15	7 12	5 15	7 12	5 14	7 13
26	5 6	7 21	5 8	7 19	5 8	7 18	5 9	7 17	5 10	7 16	5 10	7 16	5 10	7 17
28	5 3	7 21	5 3	7 22	5 5	7 21	5 6	7 20	5 8	7 20	5 7	7 19	5 6	7 19

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland.		Boston. Albany.		N. York. Philad'a.		Wash'n. Baltim'e.		Raleigh. Nashville		Ch'ston. Savann'h		N. Orl'ns. Mobile.	
		SUN		SUN		SUN		SUN		SUN		SUN		SUN	
		Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Sat.	6 37	5 48	6 36	5 50	6 34	5 52	6 33	5 53	6 30	5 56	6 28	5 58	6 26	6 0
2	*SUN.*	6 35	5 49	6 34	5 51	6 32	5 53	6 31	5 54	6 29	5 56	6 27	5 58	6 25	6 0
3	Mond.	6 33	5 51	6 33	5 52	6 31	5 54	6 30	5 55	6 28	5 57	6 26	5 59	6 24	6 1
4	Tues.	6 32	5 52	6 31	5 54	6 29	5 55	6 28	5 56	6 26	5 58	6 25	6 0	6 23	6 2
5	Wed.	6 30	5 53	6 29	5 55	6 28	5 56	6 27	5 57	6 25	5 59	6 24	6 1	6 22	6 3
6	Thur.	6 28	5 55	6 28	5 56	6 27	5 57	6 26	5 58	6 24	6 0	6 23	6 1	6 21	6 3
7	Frid.	6 26	5 56	6 26	5 58	6 25	5 59	6 24	5 59	6 23	6 1	6 22	6 2	6 20	6 4
8	Sat.	6 25	5 57	6 25	5 59	6 24	6 0	6 23	6 0	6 22	6 2	6 21	6 3	6 19	6 5
9	*SUN.*	6 23	5 59	6 23	6 0	6 22	6 1	6 21	6 1	6 20	6 2	6 20	6 3	6 18	6 5
10	Mond.	6 21	6 0	6 21	6 1	6 20	6 2	6 19	6 2	6 19	6 3	6 19	6 4	6 16	6 6
11	Tues.	6 19	6 1	6 19	6 2	6 18	6 3	6 18	6 3	6 18	6 4	6 17	6 5	6 15	6 7
12	Wed.	6 17	6 2	6 17	6 3	6 16	6 4	6 16	6 4	6 16	6 5	6 16	6 6	6 14	6 7
13	Thur.	6 16	6 4	6 16	6 4	6 15	6 5	6 15	6 5	6 15	6 6	6 14	6 6	6 13	6 8
14	Frid.	6 14	6 5	6 14	6 6	6 13	6 6	6 13	6 6	6 13	6 7	6 13	6 7	6 12	6 9
15	Sat.	6 12	6 6	6 12	6 7	6 12	6 7	6 12	6 7	6 12	6 8	6 11	6 8	6 10	6 9
16	*SUN.*	6 10	6 7	6 10	6 8	6 10	6 8	6 10	6 8	6 10	6 9	6 10	6 9	6 9	6 10
17	Mond.	6 8	6 9	6 9	6 9	6 9	6 9	6 9	6 9	6 9	6 9	6 9	6 9	6 8	6 10
18	Tues.	6 6	6 10	6 7	6 10	6 7	6 10	6 7	6 10	6 8	6 10	6 8	6 10	6 7	6 11
19	Wed.	6 5	6 11	6 5	6 11	6 5	6 11	6 5	6 11	6 6	6 11	6 6	6 11	6 6	6 11
20	Thur.	6 3	6 12	6 3	6 12	6 3	6 12	6 3	6 12	6 4	6 11	6 5	6 11	6 5	6 12
21	Frid.	6 1	6 13	6 2	6 14	6 2	6 13	6 2	6 13	6 3	6 12	6 3	6 12	6 3	6 12
22	Sat.	5 59	6 15	6 0	6 15	6 1	6 14	6 1	6 14	6 2	6 13	6 2	6 13	6 2	6 13
23	*SUN.*	5 57	6 16	5 59	6 16	6 0	6 15	6 0	6 15	6 1	6 14	6 1	6 14	6 1	6 14
24	Mond.	5 55	6 17	5 57	6 17	5 58	6 16	5 58	6 16	5 59	6 15	5 59	6 14	5 59	6 14
25	Tues.	5 54	6 18	5 55	6 19	5 56	6 17	5 56	6 17	5 57	6 16	5 58	6 15	5 58	6 15
26	Wed.	5 52	6 20	5 53	6 20	5 54	6 18	5 55	6 18	5 56	6 17	5 56	6 16	5 56	6 16
27	Thur.	5 50	6 21	5 52	6 21	5 53	6 19	5 54	6 19	5 55	6 17	5 55	6 16	5 55	6 16
28	Frid.	5 48	6 22	5 50	6 22	5 52	6 20	5 53	6 20	5 54	6 18	5 54	6 17	5 54	6 17
29	Sat.	5 46	6 23	5 48	6 23	5 50	6 21	5 51	6 20	5 52	6 19	5 53	6 18	5 53	6 17
30	*SUN.*	5 45	6 24	5 46	6 24	5 48	6 22	5 49	6 21	5 50	6 19	5 52	6 18	6 52	6 18
31	Mond.	5 43	6 26	5 44	6 25	5 46	6 23	5 47	6 22	5 49	6 20	5 50	6 19	6 50	6 18

Length and Increase of Days.

Day of the Month.	Augusta. Portland.		Boston. Albany.		New York. Philadelphia.		Washington. Baltimore.		Raleigh. Nashville.		Charleston. Savannah.		New Orleans. Mobile.	
	Length.	Incr.	Length.	Incr.	Length.	Incr.	Length.	Incr.	Length.	Incr.	Length.	Incr.	Length.	Incr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	11 11	2 20	11 14	2 10	11 17	2 2	11 20	1 54	11 25	1 43	11 30	1 31	11 34	1 21
3	11 17	2 26	11 20	2 16	11 23	2 8	11 25	1 59	11 29	1 47	11 33	1 34	11 37	1 24
5	11 24	2 32	11 26	2 22	11 28	2 13	11 30	2 4	11 34	1 52	11 37	1 38	11 41	1 28
7	11 30	2 38	11 32	2 28	11 34	2 19	11 35	2 9	11 38	1 56	11 40	1 41	11 44	1 31
9	11 36	2 44	11 37	2 33	11 39	2 24	11 40	2 14	11 42	2 0	11 44	1 45	11 47	1 34
11	11 42	2 51	11 43	2 39	11 44	2 29	11 45	2 19	11 47	2 5	11 48	1 49	11 51	1 38
13	11 48	2 57	11 48	2 44	11 49	2 34	11 50	2 24	11 51	2 9	11 52	1 53	11 55	1 42
15	11 54	3 3	11 54	2 50	11 55	2 40	11 55	2 29	11 56	2 14	11 56	1 57	11 59	1 46
17	12 0	3 9	12 0	2 56	12 0	2 45	12 0	2 34	12 0	2 18	12 0	2 1	12 2	1 49
19	12 6	3 15	12 6	3 2	12 6	2 51	12 5	2 39	12 5	2 23	12 5	2 6	12 5	1 52
21	12 13	3 21	12 12	3 8	12 11	2 56	12 10	2 44	12 9	2 27	12 9	2 10	12 9	1 56
23	12 19	3 27	12 18	3 14	12 16	3 1	12 15	2 49	12 14	2 32	12 13	2 14	12 13	2 0
25	12 25	3 34	12 24	3 20	12 22	3 7	12 20	2 54	12 18	2 36	12 17	2 18	12 17	2 4
27	12 31	3 40	12 30	3 26	12 27	3 12	12 25	2 59	12 23	2 41	12 21	2 22	12 21	2 8
29	12 37	3 46	12 35	3 31	12 32	3 17	12 30	3 4	12 27	2 45	12 25	2 26	12 24	2 11
31	12 43	3 52	12 41	3 37	12 38	3 23	12 35	3 9	12 32	2 50	12 29	2 30	12 28	2 15

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Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Rises.	Boston Albany. Rises.	N. York. Philada. Rises.	Was'ton. Bal'more. Rises	Raleigh. Nash'lle. Rises.	Cha'ston. Savannah. Rises.	N. Orl'ns. Mobile. Rises.	Moon south Washington.	Sidereal Time of Sun's Semidiam. passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Sat.	1 19 m	1 13m	1 7m	1 1 m	0 55 m	0 49 m	0 43 m	6 3m	1 5.34	60	.162
2	SUN.	2 19	2 13	2 7	2 1	1 55	1 49	1 43	7 2	1 5.27	61	.164
3	Mon.	3 12	3 7	3 1	2 56	2 50	2 44	2 39	8 1	1 5.20	62	.167
4	Tues.	3 58	3 54	3 49	3 44	3 39	3 34	3 30	8 58	1 5.13	63	.170
5	Wed.	4 37	4 34	4 30	4 26	4 23	4 19	4 15	9 53	1 5.07	64	.172
6	Thur.	5 11	5 8	5 6	5 4	5 2	4 59	4 57	10 45	1 5.01	65	.175
7	Frid.	sets	sets	sets	sets	sets	sets	sets	11 36	1 4.95	66	.178
8	Sat.	6 48 a	6 48 a	6 48a	6 48 a	6 47 a	6 47 a	6 47 a	0 25 a	1 4.89	67	.181
9	SUN.	7 56	7 54	7 53	7 51	7 49	7 48	7 46	1 13	1 4.84	68	.183
10	Mon.	9 2	8 59	8 56	8 53	8 50	8 47	8 44	2 0	1 4.79	69	.186
11	Tues.	10 6	10 1	9 57	9 53	9 49	9 45	9 41	2 48	1 4.74	70	.189
12	Wed.	11 7	11 2	10 56	10 51	10 46	10 41	10 36	3 35	1 4.70	71	.192
13	Thur.	morn	11 58	11 52	11 46	11 41	11 35	11 30	4 24	1 4.66	72	.194
14	Frid.	0 3	morn	morn	morn	morn	morn	morn	5 12	1 4.62	73	.197
15	Sat.	0 56	0 50	0 44	0 38	0 32	0 26	0 20	6 1	1 4.58	74	.200
16	SUN.	1 43	1 37	1 31	1 25	1 20	1 14	1 8	6 49	1 4.55	75	.203
17	Mon.	2 25	2 20	2 14	2 9	2 3	1 57	1 52	7 36	1 4.52	76	.205
18	Tues.	3 2	2 58	2 53	2 48	2 43	2 38	2 33	8 23	1 4.50	77	.208
19	Wed.	3 35	3 32	3 28	3 24	3 20	3 16	3 12	9 9	1 4.47	78	.211
20	Thur.	4 6	4 3	4 0	3 57	3 55	3 52	3 49	9 56	1 4.45	79	.214
21	Frid.	4 35	4 33	4 31	4 30	4 28	4 27	4 25	10 42	1 4.43	80	.216
22	Sat.	5 1	5 1	5 1	5 1	5 0	5 0	5 0	11 29	1 4.42	81	.219
23	SUN.	rises	rises	rises	rises	rises	rises	rises	morn	1 4.41	82	.222
24	Mon.	7 38 a	7 36 a	7 33a	7 31 a	7 29 a	7 26 a	7 24 a	0 18	1 4.40	83	.225
25	Tues.	8 50	8 46	8 43	8 39	8 35	8 31	8 28	1 9	1 4.40	84	.227
26	Wed.	10 1	9 57	9 52	9 47	9 42	9 37	9 32	2 3	1 4.39	85	.230
27	Thur.	11 10	11 4	10 59	10 53	10 48	10 42	10 36	2 59	1 4.39	86	.233
28	Frid.	morn	morn	morn	11 56	11 50	11 44	11 38	3 58	1 4.39	87	.235
29	Sat.	0 14	0 8	0 2	morn	morn	morn	morn	4 57	1 4.40	88	.238
30	SUN.	1 9	1 3	0 57	0 52	0 46	0 40	0 35	5 56	1 4.41	89	.241
31	Mon.	1 54	1 50	1 45	1 40	1 36	1 31	1 26	6 53	1 4.42	90	.244

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d.	h.	m.		d.	h.	m.		d.	h.	
New Moon....	8	1	28 m.	Full Moon	23	3	11 a.	Perigee	3	2 a.	
First Quarter .	15	8	45 a.	*Last Quarter* ..	30	11	52 m.	Apogee	15	7 a.	
								Perigee	28	8 m.	

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Augusta. Portland. Ends	Boston. Albany. Begins	Boston. Albany. Ends	New York. Philadelphia. Begins	New York. Philadelphia. Ends	Washington. Baltimore. Begins	Washington. Baltimore. Ends	Raleigh. Nashville. Begins	Raleigh. Nashville. Ends	Charleston. Savannah. Begins	Charleston. Savannah. Ends	New Orleans. Mobile. Begins	New Orleans. Mobile. Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	5 1	7 24	5 2	7 23	5 3	7 22	5 4	7 21	5 6	7 20	5 7	7 19	5 7	7 19
6	4 52	7 31	4 54	7 29	4 55	7 28	4 56	7 27	4 58	7 25	5 0	7 23	5 1	7 22
11	4 41	7 39	4 46	7 35	4 47	7 34	4 48	7 32	4 51	7 29	4 53	7 27	4 54	7 26
16	4 32	7 45	4 37	7 41	4 38	7 40	4 40	7 38	4 43	7 35	4 46	7 32	4 48	7 30
21	4 24	7 51	4 29	7 47	4 31	7 45	4 33	7 42	4 37	7 39	4 40	7 36	4 42	7 33
26	4 13	7 58	4 20	7 53	4 23	7 50	4 26	7 47	4 30	7 43	4 34	7 39	4 37	7 36
31	4 4	8 4	4 10	7 59	4 15	7 54	4 18	7 51	4 23	7 46	4 28	7 42	4 32	7 39

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville SUN Rises	Raleigh. Nashville SUN Sets.	Ch'ston. Savann'h SUN Rises.	Ch'ston. Savann'h SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Tues.	5 41	6 27	5 43	6 26	5 45	6 24	5 46	6 23	5 48	6 21	5 49	6 20	5 49	6 19
2	Wed.	5 39	6 28	5 42	6 28	5 44	6 26	5 45	6 24	5 47	6 22	5 48	6 21	5 48	6 20
3	Thur.	5 37	6 29	5 40	6 29	5 42	6 27	5 43	6 25	5 45	6 23	5 46	6 21	5 46	6 20
4	Frid.	5 36	6 30	5 38	6 30	5 40	6 28	5 41	6 26	5 43	6 24	5 45	6 22	5 45	6 21
5	Sat.	5 34	6 32	5 36	6 31	5 38	6 29	5 40	6 27	5 42	6 25	5 44	6 23	5 44	6 21
6	*SUN.*	5 32	6 33	5 34	6 32	5 36	6 30	5 38	6 28	5 40	6 26	5 42	6 23	5 43	6 22
7	Mond.	5 30	6 34	5 32	6 33	5 34	6 31	5 36	6 29	5 39	6 26	5 41	6 24	5 41	6 22
8	Tues.	5 28	6 36	5 31	6 34	5 33	6 32	5 35	6 30	5 37	6 27	5 39	6 25	5 40	6 23
9	Wed.	5 26	6 37	5 29	6 35	5 31	6 33	5 33	6 31	5 36	6 28	5 38	6 25	5 39	6 23
10	Thur.	5 24	6 38	5 27	6 36	5 29	6 34	5 31	6 32	5 34	6 29	5 37	6 26	5 38	6 24
11	Frid.	5 23	6 39	5 26	6 37	5 28	6 35	5 30	6 33	5 33	6 30	5 35	6 27	5 37	6 24
12	Sat.	5 21	6 40	5 24	6 38	5 26	6 36	5 28	6 34	5 31	6 30	5 34	6 27	5 36	6 25
13	*SUN.*	5 19	6 42	5 23	6 40	5 25	6 37	5 27	6 35	5 30	6 31	5 33	6 28	5 35	6 25
14	Mond.	5 18	6 43	5 21	6 41	5 24	6 38	5 26	6 36	5 29	6 32	5 32	6 29	5 34	6 26
15	Tues.	5 16	6 44	5 19	6 42	5 22	6 39	5 24	6 37	5 28	6 33	5 31	6 30	5 33	6 27
16	Wed.	5 14	6 45	5 18	6 43	5 21	6 40	5 23	6 38	5 27	6 34	5 30	6 30	5 32	6 27
17	Thur.	5 12	6 47	5 16	6 44	5 19	6 41	5 22	6 39	5 26	6 35	5 29	6 31	5 31	6 28
18	Frid.	5 11	6 48	5 14	6 45	5 17	6 42	5 20	6 40	5 24	6 36	5 28	6 32	5 30	6 29
19	Sat.	5 9	6 49	5 13	6 47	5 16	6 44	5 19	6 41	5 23	6 37	5 27	6 32	5 29	6 29
20	*SUN.*	5 7	6 50	5 11	6 48	5 14	6 45	5 17	6 42	5 21	6 38	5 25	6 33	5 28	6 30
21	Mond.	5 6	6 51	5 10	6 49	5 13	6 46	5 16	6 43	5 20	6 39	5 24	6 34	5 27	6 30
22	Tues.	5 4	6 53	5 8	6 50	5 11	6 47	5 14	9 44	5 19	6 40	5 23	6 35	5 26	6 31
23	Wed.	5 3	6 54	5 6	6 51	5 10	6 48	5 13	6 45	5 18	6 40	5 22	6 35	5 25	6 31
24	Thur.	5 1	6 55	5 5	6 52	5 9	6 49	5 12	6 46	5 17	6 41	5 21	6 36	5 24	6 32
25	Frid.	4 59	6 56	5 3	6 53	5 7	6 50	5 10	6 46	5 15	6 42	5 20	6 37	5 23	6 33
26	Sat.	4 58	6 57	5 2	6 54	5 6	6 51	5 9	6 47	5 14	6 42	5 19	6 37	5 22	6 33
27	*SUN.*	4 56	6 59	5 1	6 55	5 5	6 52	5 8	6 48	5 13	6 43	5 18	6 38	5 21	6 34
28	Mond.	4 55	7 0	4 59	6 56	5 3	6 53	5 6	6 49	5 11	6 44	5 16	6 39	5 20	6 35
29	Tues.	4 53	7 1	4 58	6 58	5 2	6 54	5 5	6 50	5 10	6 44	5 15	6 39	5 19	6 35
30	Wed.	4 52	7 2	4 56	6 59	5 0	6 55	5 3	6 51	5 9	6 45	5 14	6 40	5 18	6 36

Length and Increase of Days.

Day of the Month.	Augusta. Portland. Length.	Augusta. Portland. Incr.	Boston. Albany. Length.	Boston. Albany. Incr.	New York. Philadelphia. Length.	New York. Philadelphia. Incr.	Washington. Baltimore. Length.	Washington. Baltimore. Incr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Incr.	Charleston. Savannah. Length.	Charleston. Savannah. Incr.	New Orleans. Mobile. Length.	New Orleans. Mobile. Incr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	12 45	3 54	12 43	3 39	12 40	3 25	12 37	3 11	12 34	2 52	12 31	2 32	12 29	2 16
3	12 52	4 0	12 49	3 45	12 45	3 30	12 42	3 16	12 38	2 56	12 35	2 36	12 33	2 20
5	12 58	4 7	12 55	3 51	12 51	3 36	12 47	3 21	12 43	3 1	12 39	2 40	12 37	2 24
7	13 5	4 13	13 1	3 57	12 57	3 42	12 53	3 27	12 48	3 6	12 43	2 44	12 41	2 28
9	13 11	4 19	13 6	4 2	13 2	3 47	12 58	3 32	12 52	3 10	12 47	2 48	12 44	2 31
11	13 17	4 25	13 11	4 7	13 7	3 52	13 3	3 37	12 57	3 15	12 51	2 52	12 47	2 34
13	13 23	4 31	13 17	4 13	13 12	3 57	13 8	3 42	13 1	3 19	12 55	2 56	12 50	2 37
15	13 28	4 37	13 23	4 19	13 18	4 3	13 13	3 47	13 6	3 24	12 59	3 0	12 54	2 41
17	13 34	4 43	13 28	4 24	13 23	4 8	13 18	3 52	13 10	3 28	13 3	3 4	12 57	2 44
19	13 40	4 49	13 34	4 30	13 28	4 13	13 22	3 56	13 14	3 32	13 7	3 8	13 0	2 47
21	13 46	4 54	13 39	4 35	13 33	4 18	13 27	4 1	13 18	3 36	13 10	3 11	13 3	2 50
23	13 51	5 0	13 45	4 41	13 38	4 23	13 32	4 6	13 22	3 40	13 13	3 14	13 6	2 53
25	13 57	5 6	13 50	4 46	13 43	4 28	13 36	4 10	13 26	3 44	13 17	3 18	13 10	2 57
27	14 2	5 11	13 55	4 51	13 47	4 32	13 40	4 14	13 30	3 48	13 20	3 21	13 13	3 0
29	14 8	5 17	14 0	4 56	13 52	4 37	13 45	4 19	13 34	3 52	13 24	3 25	13 16	3 3
30	14 11	5 19	14 3	4 59	13 55	4 40	13 48	4 22	13 37	3 55	13 26	3 27	13 18	3 5

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Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Rises.	Boston Albany. Rises	N. York. Philada. Rises.	Was'ton. Bal'more. Rises	Raleigh. Nash'lle. Rises.	Cha'ton. Savannah. Rises.	N. Orl'ns. Mobile. Rises.	Moon south Washington.	Sidereal Time of the Sun's Semidiameter passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Tues.	2 37 m	2 33m	2 29m	2 25 m	2 21 m	2 17 m	2 13 m	7 48m	1 4.43	91	.246
2	Wed.	3 12	3 9	3 6	3 3	3 1	2 58	2 55	8 40	1 4.45	92	.249
3	Thur.	3 43	3 41	3 40	3 38	3 37	3 36	3 34	9 29	1 4.47	93	.252
4	Frid.	4 11	4 11	4 11	4 11	4 11	4 11	4 10	10 18	1 4.49	94	.255
5	Sat.	4 39	4 41	4 42	4 43	4 44	4 45	4 46	11 5	1 4.52	95	.257
6	*SUN.*	sets	sets	sets	sets	sets	sets	sets	11 52	1 4.55	96	.260
7	Mon.	7 51 a	7 47 a	7 43a	7 40 a	7 36 a	7 33 a	7 29 a	0 39 a	1 4.58	97	.263
8	Tues.	8 53	8 48	8 43	8 39	8 34	8 30	8 25	1 27	1 4.61	98	.266
9	Wed.	9 52	9 46	9 41	9 35	9 30	9 25	9 19	2 52	1 4.65	99	.268
10	Thur.	10 46	10 40	10 35	10 29	10 23	10 17	10 11	3 4	1 4.69	100	.271
11	Frid.	11 36	11 30	11 24	11 18	11 12	11 6	11 0	3 53	1 4.73	101	.274
12	Sat.	morn	morn	morn	morn	11 57	11 51	11 46	4 41	1 4.77	102	.277
13	*SUN.*	0 20	0 14	0 8	0 3	morn	morn	morn	5 29	1 4.82	103	.279
14	Mon.	0 59	0 54	0 48	0 43	0 38	0 33	0 28	6 15	1 4.87	104	.282
15	Tues.	1 33	1 29	1 24	1 20	1 16	1 12	1 7	7 1	1 4.92	105	.285
16	Wed.	2 4	2 1	1 57	1 54	1 51	1 48	1 45	7 47	1 4.97	106	.287
17	Thur.	2 33	2 31	2 28	2 26	2 24	2 22	2 20	8 32	1 5.03	107	.290
18	Frid.	3 0	2 59	2 58	2 58	2 57	2 56	2 55	9 19	1 5.09	108	.293
19	Sat.	3 28	3 29	3 29	3 29	3 30	3 30	3 31	10 7	1 5.15	109	.296
20	*SUN.*	3 57	3 58	4 0	4 2	4 4	4 6	4 8	10 57	1 5.21	110	.298
21	Mon.	rises	rises	rises	rises	rises	rises	rises	11 51	1 5.28	111	.301
22	Tues.	7 43 a	7 38 a	7 34a	7 30 a	7 25 a	7 21 a	7 16 a	morn	1 5.34	112	.304
23	Wed.	8 54	8 49	8 44	8 39	8 33	8 28	8 23	0 47	1 5.41	113	.307
24	Thur.	10 3	9 57	9 51	9 45	9 39	9 33	9 27	1 47	1 5.48	114	.309
25	Frid.	10 59	10 54	10 49	10 44	10 38	10 33	10 28	2 48	1 5.55	115	.312
26	Sat.	11 54	11 49	11 43	11 38	11 33	11 28	11 23	3 49	1 5.62	116	.315
27	*SUN.*	morn	morn	morn	morn	morn	morn	morn	4 48	1 5.69	117	.318
28	Mon.	0 37	0 33	0 29	0 24	0 20	0 16	0 12	5 44	1 5.76	118	.320
29	Tues.	1 15	1 11	1 7	1 4	1 0	0 56	0 53	6 37	1 5.84	119	.323
30	Wed.	1 46	1 44	1 42	1 40	1 38	1 36	1 35	7 27	1 5.91	120	.326

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d.	h.	m.		d.	h.	m.		d.	h.
New Moon....	6	2	32 a.	Full Moon	22	2	4 m.	Apogee	12	3 a.
First Quarter .	14	4	15 a.	*Last Quarter* ..	28	6	12 a.	Perigee	24	0 a.

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Ends	Boston. Albany. Begins	Ends	New York. Philadelphia. Begins	Ends	Washington. Baltimore. Begins	Ends	Raleigh. Nashville. Begins	Ends	Charleston. Savannah. Begins	Ends	New Orleans. Mobile. Begins	Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	4 0	8 7	4 8	8 1	4 12	7 58	4 15	7 53	4 20	7 48	4 25	7 43	4 29	7 39
6	3 49	8 16	3 57	8 8	4 2	8 3	4 6	7 59	4 12	7 53	4 18	7 47	4 23	7 42
11	3 30	8 23	3 47	8 15	3 52	8 10	3 56	8 6	4 3	7 59	4 11	7 51	4 16	7 46
16	3 27	8 32	3 37	8 22	3 43	8 16	3 47	8 12	3 55	8 4	4 3	7 56	4 9	7 50
21	3 17	8 41	3 27	8 30	3 34	8 23	3 39	8 18	3 47	8 10	3 55	8 2	4 2	7 55
26	3 7	8 49	3 17	8 38	3 25	8 30	3 31	8 24	3 40	8 15	3 48	8 7	3 56	7 59
30	3 2	8 53	3 9	8 45	3 18	8 36	3 24	8 30	3 34	8 20	3 44	8 10	3 53	8 1

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville SUN Rises.	Raleigh. Nashville SUN Sets.	Ch'ston. Savann'h SUN Rises.	Ch'ston. Savann'h SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Thur.	4 50	7 4	4 55	7 0	4 59	6 56	5 2	6 52	5 8	6 46	5 13	6 41	5 17	6 37
2	Frid.	4 49	7 5	4 53	7 1	4 57	6 57	5 1	6 53	5 7	6 47	5 12	6 42	5 16	6 38
3	Sat.	4 47	7 6	4 52	7 2	4 56	6 58	5 0	6 54	5 6	6 48	5 11	6 43	5 15	6 39
4	*SUN.*	4 46	7 7	4 50	7 3	4 54	6 59	4 58	6 55	5 4	6 49	5 10	6 44	5 14	6 40
5	Mond.	4 45	7 8	4 49	7 4	4 53	7 0	4 57	6 56	5 4	6 50	5 10	6 45	5 13	6 40
6	Tues.	4 43	7 9	4 48	7 5	4 52	7 1	4 56	6 57	5 3	6 51	5 9	6 45	5 13	6 41
7	Wed.	4 42	7 11	4 47	7 6	4 51	7 2	4 55	6 58	5 2	6 52	5 8	6 46	5 12	6 42
8	Thur.	4 41	7 12	4 46	7 7	4 50	7 3	4 54	6 59	5 1	6 53	5 7	6 47	5 11	6 42
9	Frid.	4 39	7 13	4 45	7 8	4 49	7 4	4 53	7 0	5 0	6 53	5 6	6 47	5 11	6 43
10	Sat.	4 38	7 14	4 44	7 9	4 48	7 5	4 52	7 1	4 59	6 54	5 5	6 48	5 10	6 44
11	*SUN.*	4 37	7 15	4 43	7 10	4 47	7 6	4 51	7 2	4 58	6 55	5 5	6 49	5 9	6 44
12	Mond.	4 36	7 17	4 42	7 11	4 46	7 7	4 50	7 3	4 57	6 56	5 4	6 49	5 9	6 45
13	Tues.	4 35	7 18	4 41	7 12	4 45	7 8	4 49	7 4	4 56	6 57	5 3	6 50	5 8	6 45
14	Wed.	4 34	7 19	4 40	7 13	4 44	7 9	4 48	7 5	4 55	6 58	5 2	6 51	5 7	6 46
15	Thur.	4 32	7 20	4 39	7 14	4 43	7 10	4 47	7 6	4 55	6 58	5 2	6 51	5 7	6 46
16	Frid.	4 31	7 21	4 38	7 15	4 42	7 11	4 46	7 7	4 54	6 59	5 1	6 52	5 6	6 47
17	Sat.	4 30	7 22	4 37	7 16	4 42	7 11	4 46	7 7	4 54	7 0	5 1	6 53	5 6	6 48
18	*SUN.*	4 29	7 23	4 36	7 17	4 41	7 12	4 45	7 8	4 53	7 0	5 0	6 53	5 5	6 48
19	Mond.	4 28	7 24	4 36	7 18	4 40	7 13	4 44	7 9	4 52	7 1	5 0	6 54	5 5	6 49
20	Tues.	4 27	7 25	4 35	7 19	4 40	7 14	4 44	7 10	4 52	7 1	4 59	6 55	5 4	6 49
21	Wed.	4 26	7 26	4 34	7 20	4 39	7 15	4 43	7 10	4 51	7 1	4 58	6 55	5 4	6 50
22	Thur.	4 25	7 27	4 33	7 21	4 38	7 16	4 43	7 11	4 51	7 3	4 58	6 56	5 3	6 50
23	Frid.	4 25	7 28	4 32	7 22	4 37	7 17	4 42	7 12	4 50	7 4	4 57	6 57	5 3	6 51
24	Sat.	4 24	7 29	4 32	7 23	4 37	7 18	4 42	7 13	4 50	7 5	4 57	6 57	5 2	6 52
25	*SUN.*	4 23	7 30	4 31	7 24	4 36	7 19	4 41	7 14	4 49	7 6	4 56	6 58	5 2	6 52
26	Mond.	4 22	7 31	4 30	7 25	4 35	7 19	4 40	7 15	4 48	7 6	4 56	6 58	5 1	6 53
27	Tues.	4 21	7 32	4 29	7 26	4 35	7 20	4 40	7 16	4 48	7 7	4 55	6 59	5 1	6 53
28	Wed.	4 21	7 33	4 29	7 27	4 34	7 21	4 39	7 16	4 47	7 8	4 55	7 0	5 1	6 54
29	Thur.	4 20	7 34	4 28	7 28	4 34	7 22	4 39	7 17	4 47	7 8	4 55	7 0	5 0	6 54
30	Frid.	4 20	7 35	4 27	7 28	4 33	7 23	4 38	7 18	4 46	7 9	4 54	7 1	5 0	6 55
31	Sat.	4 19	7 36	4 26	7 29	4 32	7 23	4 37	7 18	4 46	7 9	4 54	7 1	5 0	6 55

Length and Increase of Days.

Day of the Month.	Augusta. Portland. Length.	Augusta. Portland. Incr.	Boston. Albany. Length.	Boston. Albany. Incr.	New York. Philadelphia. Length.	New York. Philadelphia. Incr.	Washington. Baltimore. Length.	Washington. Baltimore. Incr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Decr.	Charleston. Savannah. Length.	Charleston. Savannah. Decr.	New Orleans. Mobile. Length.	New Orleans. Mobile. Decr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	14 13	5 22	14 5	5 1	13 57	4 42	13 50	4 24	13 39	3 57	13 28	3 29	13 20	3 7
3	14 18	5 27	14 10	5 6	14 2	4 47	13 54	4 28	13 43	4 1	13 32	3 33	13 24	3 11
5	14 24	5 32	14 15	5 11	14 7	4 52	13 59	4 33	13 47	4 5	13 35	3 36	13 27	3 14
7	14 29	5 37	14 19	5 15	14 11	4 56	14 3	4 37	13 50	4 8	13 38	3 39	13 30	3 17
9	14 34	5 42	14 23	5 19	14 15	5 0	14 7	4 41	13 54	4 12	13 41	3 42	13 32	3 19
11	14 38	5 47	14 27	5 23	14 19	5 4	14 11	4 45	13 57	4 15	13 44	3 45	13 35	3 22
13	14 43	5 52	14 31	5 27	14 23	5 8	14 15	4 49	14 1	4 19	13 47	3 48	13 37	3 24
15	14 47	5 56	14 35	5 31	14 27	5 12	14 18	4 52	14 4	4 22	13 49	3 50	13 39	3 26
17	14 52	6 1	14 39	5 35	14 30	5 15	14 21	4 55	14 7	4 25	13 52	3 53	13 42	3 29
19	14 56	6 5	14 42	5 38	14 34	5 19	14 24	4 58	14 9	4 27	13 54	3 55	13 44	3 31
21	15 0	6 9	14 46	5 42	14 37	5 22	14 27	5 1	14 12	4 30	13 57	3 58	13 46	3 33
23	15 4	6 12	14 50	5 46	14 40	5 25	14 20	5 4	14 15	4 33	14 0	4 1	13 48	3 35
25	15 7	6 16	14 53	5 49	14 43	5 28	14 33	5 7	14 17	4 35	14 2	4 3	13 50	3 37
27	15 11	6 20	14 57	5 53	14 46	5 31	14 36	5 10	14 20	4 38	14 4	4 5	13 52	3 39
29	15 14	6 23	15 0	5 56	14 49	5 34	14 39	5 13	14 22	4 40	14 5	4 6	13 54	3 41
31	15 17	6 26	15 3	5 59	14 52	5 37	14 41	5 15	14 24	4 42	14 7	4 8	13 55	3 42

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Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Rises.	Boston. Albany. Rises.	N. York. Philadp. Rises.	Was'ton. Bal'more. Rises	Raleigh. Nash'lle. Rises.	Cha'ston. Savannah. Rises.	N. Orl'ns. Mobile. Rises.	Mean south Washington.	Sidereal Time of the Sun's Semidiam. passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Thur.	2 15 m	2 14m	2 14m	2 13 m	2 13m	2 12m	2 11m	8 15m	1 5.99	121	.329
2	Frid.	2 42	2 43	2 44	2 45	2 45	2 46	2 47	9 2	1 6.06	122	.331
3	Sat.	3 10	3 12	3 14	3 16	3 18	3 20	3 22	9 48	1 6.14	123	.334
4	*SUN.*	3 38	3 42	3 45	3 48	3 51	3 55	3 58	10 34	1 6.22	124	.337
5	Mon.	4 9	4 13	4 18	4 22	4 26	4 31	4 35	11 22	1 6.30	125	.339
6	Tues.	sets	sets	sets	sets	sets	sets	sets	0 10	1 6.38	126	.342
7	Wed.	8 38 a	8 32 a	8 27a	8 21 a	8 15 a	8 9 a	8 4 a	0 5 a	1 6.46	127	.345
8	Thur.	9 30	9 24	9 18	9 12	9 6	9 0	8 54	1 47	1 6.54	128	.348
9	Frid.	10 16	10 10	10 4	9 58	9 53	9 47	9 41	2 35	1 6.63	129	.350
10	Sat.	10 56	10 51	10 46	10 40	10 35	10 30	10 24	3 23	1 6.72	130	.353
11	*SUN.*	11 32	11 27	11 23	11 18	11 14	11 9	11 5	4 10	1 6.80	131	.356
12	Mon.	morn	11 59	11 53	11 48	11 43	11 38	11 32	4 55	1 6.88	132	.359
13	Tues.	0 4	morn	morn	morn	morn	morn	morn	5 40	1 6.96	133	.361
14	Wed.	0 33	0 30	0 28	0 25	0 23	0 20	0 17	6 25	1 7.04	134	.364
15	Thur.	1 0	0 58	0 57	0 56	0 54	0 53	0 52	7 10	1 7.12	135	.367
16	Frid.	1 27	1 27	1 26	1 26	1 26	1 26	1 26	7 56	1 7.20	136	.370
17	Sat.	1 54	1 55	1 57	1 58	1 59	2 0	2 1	8 44	1 7.28	137	.372
18	*SUN.*	2 23	2 26	2 29	2 31	2 34	2 36	2 39	9 35	1 7.36	138	.375
19	Mon.	2 57	3 1	3 5	3 8	3 12	3 16	3 20	10 30	1 7.44	139	.378
20	Tues.	3 35	3 40	3 46	3 51	3 56	4 1	4 6	11 29	1 7.52	140	.381
21	Wed.	rises	rises	rises	rises	rises	rises	rises	morn	1 7.59	141	.383
22	Thur.	8 44 a	8 39 a	8 34a	8 29 a	8 24 a	8 18 a	8 13 a	0 31	1 7.67	142	.386
23	Frid.	9 45	9 40	9 34	9 30	9 23	9 18	9 12	1 34	1 7.74	143	.389
24	Sat.	10 34	10 29	10 24	10 20	10 15	10 10	10 6	2 36	1 7.81	144	.392
25	*SUN.*	11 14	11 10	11 7	11 3	11 0	10 56	10 53	3 35	1 7.88	145	.394
26	Mon.	11 48	11 46	11 44	11 41	11 39	11 37	11 35	4 31	1 7.95	146	.397
27	Tues.	morn	morn	morn	morn	morn	morn	morn	5 23	1 8.02	147	.400
28	Wed	0 18	0 17	0 16	0 15	0 14	0 13	0 12	6 13	1 8.09	148	.402
29	Thur.	0 47	0 47	0 47	0 48	0 48	0 48	0 49	7 0	1 8.15	149	.405
30	Frid.	1 14	1 16	1 17	1 19	1 21	1 22	1 24	7 46	1 8.21	150	.408
31	Sat.	1 42	1 45	1 48	1 50	1 53	1 56	1 59	8 33	1 8.27	151	.411

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d.	h.	m.		d.	h.	m.		d	h.
New Moon....	6	4	49 m.	Full Moon	21	10	50 m.	Apogee	11	9 m.
First Quarter .	14	9	0 m.	*Last Quarter* ..	28	1	17 m.	Perigee	22	2 a.

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Augusta. Portland. Ends	Boston. Albany. Begins	Boston. Albany. Ends	New York. Philadelphia. Begins	New York. Philadelphia. Ends	Washington. Baltimore. Begins	Washington. Baltimore. Ends	Raleigh. Nashville. Begins	Raleigh. Nashville. Ends	Charleston. Savannah. Begins	Charleston. Savannah. Ends	New Orleans. Mobile. Begins	New Orleans. Mobile. Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	2 55	8 59	3 7	8 47	3 16	8 38	3 22	8 32	3 32	8 21	3 43	8 11	3 51	8 3
6	2 45	9 8	2 58	8 56	3 8	8 46	3 14	8 40	3 26	8 28	3 37	8 17	3 45	8 9
11	2 34	9 18	2 51	9 4	3 0	8 54	3 6	8 47	3 19	8 34	3 31	8 22	3 40	8 14
16	2 25	9 28	2 42	9 12	2 52	9 2	2 59	8 54	3 13	8 41	3 26	8 28	3 36	8 19
21	2 16	9 37	2 33	9 20	2 44	9 9	2 52	9 1	3 7	8 47	3 21	8 32	3 32	8 23
26	2 7	9 46	2 24	9 28	2 37	9 16	2 46	9 7	3 2	8 51	3 17	8 36	3 28	8 26
31	2 0	9 55	2 15	9 35	2 31	9 22	2 42	9 12	2 58	8 56	3 14	8 40	3 25	8 29

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville. SUN Rises.	Raleigh. Nashville. SUN Sets.	Ch'ston. Savann'h SUN Rises.	Ch'ston. Savann'h SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	*SUN.*	4 18	7 37	4 26	7 30	4 32	7 24	4 37	7 19	4 46	7 10	4 54	7 2	5 0	6 56
2	Mond.	4 18	7 37	4 25	7 31	4 31	7 25	4 37	7 19	4 45	7 10	4 53	7 2	4 59	6 56
3	Tues.	4 17	7 38	4 25	7 32	4 31	7 26	4 36	7 20	4 45	7 11	4 53	7 3	4 59	6 57
4	Wed.	4 17	7 39	4 24	7 32	4 30	7 26	4 36	7 20	4 45	7 11	4 53	7 3	4 59	6 57
5	Thur.	4 17	7 40	4 24	7 33	4 30	7 27	4 36	7 21	4 45	7 12	4 53	7 4	4 59	6 58
6	Frid.	4 16	7 41	4 23	7 33	4 29	7 27	4 35	7 21	4 44	7 12	4 52	7 4	4 59	6 58
7	Sat.	4 16	7 41	4 23	7 34	4 29	7 28	4 35	7 22	4 44	7 13	4 52	7 5	4 59	6 58
8	*SUN.*	4 16	7 42	4 23	7 35	4 29	7 29	4 35	7 23	4 44	7 14	4 52	7 5	4 59	6 59
9	Mond.	4 16	7 42	4 22	7 35	4 28	7 29	4 34	7 23	4 43	7 14	4 52	7 6	4 59	6 59
10	Tues.	4 15	7 43	4 22	7 36	4 28	7 30	4 34	7 24	4 43	7 15	4 52	7 6	4 59	7 0
11	Wed.	4 15	7 43	4 22	7 36	4 28	7 30	4 34	7 24	4 43	7 15	4 52	7 7	4 59	7 0
12	Thur.	4 15	7 44	4 22	7 37	4 28	7 31	4 34	7 25	4 43	7 16	4 52	7 7	4 59	7 0
13	Frid.	4 15	7 44	4 22	7 37	4 28	7 31	4 34	7 25	4 43	7 16	4 52	7 8	4 59	7 1
14	Sat.	4 15	7 45	4 22	7 38	4 28	7 32	4 34	7 26	4 43	7 16	4 52	7 8	4 59	7 1
15	*SUN.*	4 15	7 46	4 22	7 38	4 28	7 32	4 34	7 26	4 43	7 16	4 52	7 8	4 59	7 1
16	Mond.	4 15	7 46	4 22	7 38	4 28	7 32	4 34	7 26	4 43	7 17	4 52	7 9	4 59	7 2
17	Tues.	4 15	7 46	4 22	7 39	4 28	7 33	4 34	7 27	4 43	7 18	4 52	7 9	4 59	7 2
18	Wed.	4 15	7 47	4 22	7 39	4 28	7 33	4 34	7 27	4 43	7 18	4 52	7 9	4 59	7 2
19	Thur.	4 15	7 47	4 22	7 39	4 28	7 33	4 34	7 27	4 43	7 18	4 52	7 9	4 59	7 2
20	Frid.	4 15	7 47	4 22	7 39	4 28	7 33	4 34	7 27	4 43	7 18	4 52	7 10	4 59	7 3
21	Sat.	4 15	7 48	4 23	7 39	4 29	7 34	4 35	7 28	4 44	7 19	4 53	7 10	4 59	7 3
22	*SUN.*	4 16	7 48	4 23	7 39	4 29	7 34	4 35	7 28	4 44	7 19	4 53	7 10	4 59	7 3
23	Mond.	4 16	7 48	4 23	7 40	4 29	7 34	4 35	7 28	4 44	7 19	4 53	7 10	4 59	7 3
24	Tues.	4 16	7 48	4 23	7 40	4 29	7 34	4 35	7 28	4 44	7 19	4 53	7 10	5 0	7 4
25	Wed.	4 16	7 48	4 23	7 40	4 29	7 34	4 35	7 29	4 44	7 20	4 53	7 11	5 0	7 4
26	Thur.	4 17	7 48	4 23	7 40	4 29	7 35	4 35	7 29	4 44	7 20	4 53	7 11	5 0	7 4
27	Frid.	4 17	7 48	4 24	7 40	4 30	7 35	4 36	7 29	4 45	7 20	4 54	7 11	5 0	7 4
28	Sat.	4 18	7 48	4 24	7 40	4 30	7 35	4 36	7 29	4 45	7 20	4 54	7 11	5 1	7 4
29	*SUN.*	4 18	7 48	4 24	7 40	4 30	7 35	4 36	7 29	4 45	7 20	4 54	7 11	5 1	7 4
30	Mond.	4 19	7 48	4 25	7 40	4 31	7 35	4 37	7 29	4 46	7 20	4 55	7 11	5 1	7 4

Length and Increase of Days.

Day of the Month.	Augusta. Portland. Length.	Augusta. Portland. Incr.	Boston. Albany. Length.	Boston. Albany. Incr.	New York. Philadelphia. Length.	New York. Philadelphia. Incr.	Washington. Baltimore. Length.	Washington. Baltimore. Incr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Incr.	Charleston. Savannah. Length.	Charleston. Savannah. Incr.	New Orleans Mobile. Length.	New Orleans Mobile. Incr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	15 18	6 27	15 4	6 0	14 53	5 38	14 42	5 16	14 25	4 43	14 8	4 9	13 56	3 43
3	15 21	6 29	15 7	6 3	14 55	5 40	14 44	5 18	14 27	4 45	14 10	4 11	13 58	3 45
5	15 23	6 32	15 9	6 5	14 57	5 42	14 45	5 19	14 28	4 46	14 11	4 12	13 59	3 46
7	15 25	6 34	15 11	6 7	14 59	5 44	14 47	5 21	14 30	4 48	14 13	4 14	13 59	3 46
9	15 27	6 35	15 13	6 9	15 1	5 46	14 49	5 23	14 31	4 49	14 14	4 15	14 0	3 47
11	15 28	6 37	15 14	6 10	15 2	5 47	14 50	5 24	14 32	4 50	14 15	4 16	14 1	3 48
13	15 29	6 38	15 15	6 11	15 3	5 48	14 51	5 25	14 33	4 51	14 16	4 17	14 2	3 49
15	15 31	6 39	15 16	6 12	15 4	5 49	14 52	5 26	14 34	4 52	14 16	4 17	14 2	3 49
17	15 32	6 40	15 17	6 13	15 5	5 50	14 53	5 26	14 35	4 53	14 17	4 18	14 3	3 50
19	15 32	6 40	15 17	6 13	15 5	5 50	14 53	5 26	14 35	4 53	14 17	4 18	14 3	3 50
21	15 32	Dec.	15 17	Dec.	15 5	Dec.	14 53	Dec.	14 35	Dec.	14 17	Dec.	14 3	Dec.
23	15 32	0 0	15 17	0 0	15 5	0 0	14 53	0 0	14 35	0 0	14 17	0 0	14 3	0 0
25	15 31	0 1	15 17	0 0	15 5	0 0	14 53	0 0	14 35	0 0	14 17	0 0	14 3	0 0
27	15 31	0 1	15 16	0 1	15 4	0 1	14 53	0 0	14 35	0 0	14 17	0 0	14 3	0 0
29	15 30	0 2	15 16	0 1	15 4	0 1	14 53	0 0	14 35	0 0	14 17	0 0	14 3	0 0
30	15 29	0 3	15 15	0 2	15 3	0 2	14 52	0 1	14 34	0 1	14 16	0 1	14 3	0 0

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Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Rises.	Boston. Albany. Rises.	N. York. Philada. Rises.	Wash'ton. Bal'more. Rises	Raleigh. Nash'lle. Rises.	Ch'ston. Savannah. Rises.	N. Orl'ns. Mobile. Rises.	Moon south Washington.	Sidereal Time of the Sun's Semi-diurnal passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	*SUN.*	2 11 m	2 16m	2 20m	2 24 m	2 28 m	2 32 m	2 36 m	9 19m	1 8.33	152	.413
2	Mon.	2 44	2 49	2 54	2 59	3 4	3 9	3 14	10 6	1 8.38	153	.416
3	Tues.	3 20	3 26	3 32	3 38	3 44	3 50	3 56	10 54	1 8.43	154	.419
4	Wed.	sets	sets	sets	sets	sets	sets	sets	11 43	1 8.48	155	.422
5	Thur.	8 13 a	8 7 a	8 1a	7 55 a	7 49 a	7 43 a	7 38 a	0 31 a	1 8.53	156	.424
6	Frid.	8 55	8 50	8 44	8 39	8 33	8 28	8 22	1 19	1 8.57	157	.427
7	Sat.	9 33	9 28	9 23	9 18	9 13	9 8	9 3	2 6	1 8.61	158	.430
8	*SUN.*	10 6	10 2	9 58	9 54	9 50	9 46	9 42	2 52	1 8.65	159	.433
9	Mon.	10 35	10 32	10 29	10 27	10 24	10 21	10 18	3 37	1 8.69	160	.435
10	Tues.	11 3	11 1	10 59	10 57	10 55	10 53	10 52	4 41	1 8.72	161	.438
11	Wed.	11 29	11 28	11 28	11 27	11 26	11 26	11 25	5 5	1 8.75	162	.441
12	Thur.	11 55	11 56	11 57	11 57	11 58	11 58	11 59	5 49	1 8.78	163	.444
13	Frid.	morn	morn	morn	morn	morn	morn	morn	6 35	1 8.81	164	.446
14	Sat.	0 22	0 24	0 26	0 28	0 30	0 32	0 34	7 23	1 8.83	165	.449
15	*SUN.*	0 53	0 56	0 59	1 3	1 6	1 9	1 12	8 15	1 8.85	166	.452
16	Mon.	1 28	1 32	1 37	1 41	1 46	1 50	1 55	9 10	1 8.86	167	.454
17	Tues.	2 8	2 14	2 20	2 26	2 31	2 37	2 43	10 8	1 8.87	168	.457
18	Wed.	2 56	3 3	3 9	3 16	3 23	3 29	3 36	11 13	1 8.88	169	.460
19	Thur.	rises	rises	rises	rises	rises	rises	rises	morn	1 8.89	170	.463
20	Frid.	8 21 a	8 16 a	8 11a	8 6 a	8 0 a	7 55 a	7 50 a	0 17	1 3.89	171	.465
21	Sat.	9 6	9 2	8 58	8 54	8 50	8 45	8 41	1 7	1 8.89	172	.468
22	*SUN.*	9 45	9 42	9 39	9 36	9 33	9 30	9 28	2 16	1 8.88	173	.471
23	Mon.	10 18	10 16	10 15	10 13	10 12	10 10	10 9	3 12	1 8.87	174	.474
24	Tues.	10 48	10 47	10 46	10 46	10 45	10 44	10 44	4 5	1 8.86	175	.476
25	Wed.	11 16	11 17	11 19	11 20	11 21	11 22	11 23	4 54	1 8.85	176	.479
26	Thur.	11 46	11 49	11 51	11 53	11 56	11 58	morn	5 42	1 8.83	177	.482
27	Frid.	morn	morn	morn	morn	morn	morn	0 1	6 31	1 8.81	178	.485
28	Sat.	0 15	0 19	0 22	0 26	0 30	0 33	0 37	7 17	1 8.78	179	.487
29	*SUN.*	0 48	0 52	0 57	1 1	1 6	1 11	1 15	8 4	1 8.75	180	.490
30	Mon.	1 21	1 27	1 33	1 38	1 44	1 50	1 56	8 51	1 8.72	181	.493

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d.	h.	m.		d.	h.	m.		d.	h.
New Moon....	4	8	0 a.	Full Moon	19	6	10 a.	Apogee	6	6 a.
First Quarter .	12	10	35 a.	*Last Quarter* ..	26	10	19 m.	Perigee	20	0 m.

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Augusta. Portland. Ends	Boston. Albany. Begins	Boston. Albany. Ends	New York. Philadelphia. Begins	New York. Philadelphia. Ends	Washington. Baltimore. Begins	Washington. Baltimore. Ends	Raleigh. Nashville. Begins	Raleigh. Nashville. Ends	Charleston. Savannah. Begins	Charleston. Savannah. Ends	New Orleans. Mobile. Begins	New Orleans. Mobile. Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	1 59	9 56	2 17	9 37	2 32	9 23	2 41	9 13	2 57	8 57	3 13	8 41	3 24	8 31
6	1 53	10 4	2 13	9 43	2 29	9 27	2 38	9 18	2 54	9 1	3 11	8 45	3 23	8 34
11	1 49	10 9	2 10	9 48	2 26	9 32	2 36	9 23	2 53	9 5	3 10	8 48	3 22	8 37
16	1 47	10 14	2 8	9 52	2 25	9 35	2 35	9 25	2 52	9 7	3 10	8 50	3 22	8 39
21	1 47	10 16	2 8	9 54	2 25	9 37	2 35	9 27	2 52	9 9	3 10	8 52	3 22	8 41
26	1 49	10 16	2 9	9 55	2 27	9 38	2 36	9 28	2 53	9 11	3 11	8 53	3 23	8 41
30	1 52	10 14	2 10	9 55	2 2[illegible]	9 37	2 38	9 27	2 55	9 10	3 12	8 53	3 24	8 42

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville. SUN Rises.	Raleigh. Nashville. SUN Sets.	Ch'ston. Savann'h. SUN Rises.	Ch'ston. Savann'h. SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Tues.	4 19	7 48	4 25	7 40	4 31	7 34	4 37	7 29	4 46	7 20	4 55	7 11	5 1	7 4
2	Wed.	4 20	7 48	4 26	7 40	4 32	7 34	4 37	7 29	4 46	7 20	4 55	7 11	5 1	7 4
3	Thur.	4 20	7 47	4 27	7 40	4 33	7 34	4 38	7 29	4 47	7 20	4 56	7 11	5 1	7 4
4	Frid.	4 21	7 47	4 27	7 39	4 33	7 33	4 38	7 28	4 47	7 19	4 56	7 11	5 2	7 4
5	Sat.	4 22	7 47	4 28	7 39	4 34	7 33	4 39	7 28	4 48	7 19	4 57	7 11	5 2	7 4
6	*SUN.*	4 22	7 46	4 29	7 39	4 35	7 33	4 40	7 28	4 48	7 19	4 57	7 11	5 3	7 4
7	Mond.	4 23	7 46	4 29	7 39	4 35	7 33	4 40	7 28	4 49	7 19	4 58	7 11	5 4	7 4
8	Tues.	4 24	7 46	4 30	7 38	4 36	7 32	4 41	7 27	4 50	7 18	4 58	7 10	5 4	7 4
9	Wed.	4 25	7 45	4 31	7 38	4 37	7 32	4 42	7 27	4 51	7 18	4 59	7 10	5 5	7 4
10	Thur.	4 25	7 45	4 32	7 38	4 37	7 32	4 42	7 27	4 52	7 18	5 0	7 10	5 5	7 3
11	Frid.	4 26	7 44	4 33	7 37	4 38	7 31	4 43	7 26	4 52	7 18	5 0	7 10	5 6	7 3
12	Sat.	4 27	7 44	4 33	7 37	4 39	7 31	4 44	7 26	4 53	7 17	5 1	7 9	5 6	7 3
13	*SUN.*	4 28	7 43	4 34	7 36	4 40	7 30	4 45	7 25	4 53	7 17	5 1	7 9	5 7	7 3
14	Mond.	4 29	7 42	4 35	7 36	4 40	7 30	4 45	7 25	4 54	7 17	5 2	7 9	5 8	7 2
15	Tues.	4 30	7 42	4 36	7 35	4 41	7 29	4 46	7 24	4 55	7 16	5 3	7 8	5 8	7 2
16	Wed.	4 30	7 41	4 37	7 34	4 42	7 29	4 47	7 24	4 55	7 16	5 3	7 8	5 9	7 2
17	Thur.	4 31	7 40	4 37	7 34	4 43	7 28	4 48	7 23	4 56	7 15	5 4	7 8	5 10	7 1
18	Frid.	4 32	7 39	4 38	7 33	4 44	7 28	4 49	7 23	4 57	7 15	5 4	7 7	5 10	7 1
19	Sat.	4 33	7 39	4 39	7 32	4 45	7 27	4 50	7 22	4 58	7 14	5 5	7 7	5 11	7 0
20	*SUN.*	4 34	7 38	4 40	7 32	4 45	7 26	4 50	7 21	4 58	7 13	5 5	7 6	5 11	7 0
21	Mond.	4 35	7 37	4 41	7 31	4 46	7 26	4 51	7 21	4 59	7 13	5 6	7 6	5 12	6 59
22	Tues.	4 36	7 36	4 42	7 30	4 47	7 25	4 52	7 20	5 0	7 12	5 7	7 5	5 12	6 59
23	Wed.	4 37	7 35	4 43	7 29	4 48	7 24	4 53	7 19	5 0	7 12	5 7	7 5	5 13	6 58
24	Thur.	4 38	7 34	4 44	7 28	4 49	7 23	4 53	7 18	5 1	7 11	5 8	7 4	5 13	6 57
25	Frid.	4 39	7 33	4 45	7 27	4 50	7 22	4 54	7 17	5 1	7 10	5 8	7 3	5 14	6 57
26	Sat.	4 40	7 32	4 46	7 26	4 51	7 21	4 55	7 17	5 2	7 10	5 9	7 3	5 14	6 56
27	*SUN.*	4 41	7 31	4 47	7 25	4 52	7 20	4 56	7 16	5 3	7 9	5 10	7 2	5 15	6 55
28	Mond	4 43	7 30	4 48	7 24	4 52	7 19	4 56	7 15	5 4	7 8	5 11	7 1	5 16	6 55
29	Tues.	4 44	7 28	4 49	7 23	4 53	7 18	4 57	7 14	5 4	7 7	5 11	7 0	5 16	6 54
30	Wed.	4 45	7 27	4 50	7 22	4 54	7 18	4 58	7 14	5 5	7 7	5 12	7 0	5 17	6 54
31	Thur.	4 46	7 26	4 51	7 21	4 55	7 17	4 59	7 13	5 6	7 6	5 13	6 59	5 18	6 53

Length and Decrease of Days.

Day of the Month.	Augusta. Portland. Length.	Augusta. Portland. Decr.	Boston. Albany. Length.	Boston. Albany. Decr.	New York. Philadelphia. Length.	New York. Philadelphia. Decr.	Washington. Baltimore. Length.	Washington. Baltimore. Decr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Decr.	Charleston. Savannah. Length.	Charleston. Savannah. Decr.	New Orleans. Mobile. Length.	New Orleans. Mobile. Decr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	15 28	0 4	15 14	0 3	15 3	0 2	14 52	0 1	14 34	0 1	14 16	0 1	14 3	0 0
3	15 27	0 5	15 13	0 4	15 2	0 3	14 51	0 2	14 33	0 2	14 15	0 2	14 3	0 0
5	15 25	0 7	15 11	0 6	15 1	0 4	14 49	0 4	14 32	0 3	14 14	0 3	14 2	0 1
7	15 23	0 9	15 9	0 8	14 59	0 6	14 47	0 6	14 30	0 5	14 13	0 4	14 0	0 2
9	15 20	0 12	15 7	0 10	14 57	0 8	14 45	0 8	14 28	0 7	14 11	0 6	13 59	0 4
11	15 18	0 14	15 4	0 13	14 54	0 11	14 43	0 10	14 26	0 9	14 10	0 7	13 57	0 6
13	15 15	0 17	15 2	0 15	14 51	0 14	14 40	0 13	14 24	0 11	14 8	0 9	13 56	0 7
15	15 12	0 20	14 59	0 18	14 48	0 17	14 38	0 15	14 22	0 13	14 6	0 11	13 54	0 9
17	15 9	0 23	14 56	0 21	14 45	0 20	14 35	0 18	14 20	0 15	14 4	0 13	13 51	0 12
19	15 5	0 27	14 53	0 24	14 42	0 23	14 32	0 21	14 17	0 18	14 2	0 15	13 49	0 14
21	15 2	0 30	14 50	0 27	14 39	0 26	14 29	0 24	14 15	0 20	14 0	0 17	13 47	0 16
23	14 58	0 34	14 46	0 31	14 36	0 29	14 26	0 27	14 12	0 23	13 58	0 19	13 45	0 18
25	14 54	0 38	14 42	0 35	14 32	0 33	14 23	0 30	14 9	0 26	13 55	0 22	13 43	0 20
27	14 49	0 43	14 38	0 39	14 29	0 36	14 20	0 33	14 6	0 29	13 52	0 25	13 40	0 23
29	14 45	0 47	14 34	0 43	14 25	0 40	14 17	0 36	14 3	0 32	13 49	0 28	13 38	0 25
31	14 40	0 52	14 30	0 47	14 22	0 43	14 14	0 39	14 0	0 35	13 46	0 31	13 35	0 28

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Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Rises.	Boston Albany. Rises.	N. York. Philada. Rises.	Was'ton. Bal'more. Rises.	Raleigh. Nash'lle. Rises.	Cha'ston. Savannah. Rises.	N. Orl'ns. Mobile. Rises.	Moon south Washington.	Sidereal Time of the Sun's Semi-diameter, passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Tues.	2 5 m	2 11m	2 17m	2 22 m	2 28 m	2 33 m	2 39 m	9 40m	1 8.69	182	.496
2	Wed.	2 45	2 52	2 58	3 5	3 12	3 18	3 25	10 28	1 8.65	183	.498
3	Thur.	3 34	3 40	3 47	3 54	4 0	4 7	4 14	11 16	1 8.61	184	.501
4	Frid.	sets	sets	sets	sets	sets	sets	sets	0 4 a	1 8.57	185	.504
5	Sat.	8 8 a	8 4 a	8 0a	7 55 a	7 51 a	7 47 a	7 43 a	0 50	1 8.53	186	.507
6	*SUN.*	8 39	8 36	8 33	8 29	8 26	8 23	8 19	1 35	1 8.48	187	.509
7	Mon.	9 7	9 5	9 3	9 1	8 58	8 56	8 54	2 20	1 8.43	188	.512
8	Tues.	9 34	9 33	9 32	9 31	9 29	9 28	9 27	3 3	1 8.38	189	.515
9	Wed.	10 0	10 0	10 0	10 0	10 0	10 0	10 0	3 47	1 8.32	190	.517
10	Thur.	10 26	10 27	10 29	10 30	10 32	10 33	10 34	4 31	1 8.26	191	.520
11	Frid.	10 54	10 57	11 0	11 2	11 5	11 7	11 10	5 17	1 8.20	192	.523
12	Sat.	11 26	11 30	11 34	11 38	11 41	11 45	11 29	6 6	1 8.14	193	.526
13	*SUN.*	morn	morn	morn	morn	morn	morn	morn	6 58	1 8.08	194	.528
14	Mon.	0 3	0 8	0 13	0 18	0 23	0 28	0 33	7 54	1 8.01	195	.531
15	Tues.	0 46	0 52	0 57	1 5	1 11	1 17	1 23	8 53	1 7.94	196	.534
16	Wed.	1 39	1 46	1 52	1 59	2 6	2 12	2 19	9 55	1 7.87	197	.537
17	Thur.	2 41	2 48	2 56	3 2	3 9	3 15	3 22	10 59	1 7.80	198	.539
18	Frid.	rises	rises	rises	rises	rises	rises	rises	morn	1 7.72	199	.542
19	Sat.	7 43 a	7 39 a	7 35a	7 31 a	7 27 a	7 23 a	7 19 a	0 0	1 7.65	200	.545
20	*SUN.*	8 17	8 15	8 12	8 10	8 8	8 6	8 4	0 59	1 7.57	201	.548
21	Mon.	8 49	8 48	8 47	8 47	8 46	8 45	8 44	1 54	1 7.49	202	.550
22	Tues.	9 19	9 20	9 20	9 21	9 22	9 22	9 23	2 46	1 7.41	203	.553
23	Wed.	9 48	9 50	9 52	9 54	9 56	9 58	10 0	3 37	1 7.33	204	.556
24	Thur.	10 18	10 21	10 24	10 27	10 30	10 33	10 37	4 25	1 7.25	205	.559
25	Frid.	10 49	10 54	10 58	11 2	11 6	11 11	11 15	5 13	1 7.17	206	.561
26	Sat.	11 23	11 28	11 34	11 39	11 44	11 50	11 55	6 0	1 7.08	207	.564
27	*SUN.*	morn	morn	morn	morn	morn	morn	morn	6 48	1 7.00	208	.567
28	Mon.	0 1	0 7	0 13	0 19	0 25	0 31	0 37	7 36	1 6.91	209	.569
29	Tues.	0 43	0 50	0 56	1 3	1 9	1 16	1 22	8 25	1 6.83	210	.572
30	Wed.	1 30	1 37	1 44	1 50	1 57	2 4	2 10	9 13	1 6.74	211	.575
31	Thur.	2 22	2 28	2 35	2 41	2 48	2 54	3 1	10 1	1 6 66	212	.578

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d. h. m.		d. h. m.		d h.
New Moon....	4 11 32 m.	Full Moon	19 0 55 m.	Apogee	3 10 a.
First Quarter .	12 9 14 m.	*Last Quarter* ..	25 10 12 a.	Perigee	18 10 m.
				Apogee	31 4 m.

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Augusta. Portland. Ends	Boston. Albany. Begins	Boston. Albany. Ends	New York. Philadelphia. Begins	New York. Philadelphia. Ends	Washington. Baltimore. Begins	Washington. Baltimore. Ends	Raleigh. Nashville. Begins	Raleigh. Nashville. Ends	Charleston. Savannah. Begins	Charleston. Savannah. Ends	New Orleans. Mobile. Begins	New Orleans. Mobile. Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	1 54	10 13	2 12	9 54	2 28	9 37	2 39	9 27	2 56	9 10	3 13	8 53	3 25	8 41
6	1 59	10 9	2 18	9 50	2 33	9 34	2 43	9 25	2 59	9 8	3 16	8 52	3 28	8 39
11	2 6	10 4	2 25	9 45	2 39	9 30	2 48	9 21	3 4	9 6	3 20	8 50	3 31	8 37
16	2 15	9 56	2 31	9 40	2 45	9 26	2 54	9 17	3 9	9 2	3 24	8 47	3 35	8 35
21	2 24	9 48	2 38	9 34	2 51	9 20	3 0	9 12	3 14	8 58	3 28	8 44	3 39	8 32
26	2 33	9 40	2 45	9 27	2 57	9 15	3 6	9 6	3 19	8 53	3 32	8 40	3 42	8 29
31	2 42	9 30	2 53	9 19	3 4	9 8	3 12	9 0	3 25	8 52	3 38	8 34	3 46	8 25

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville SUN Rises.	Raleigh. Nashville SUN Sets.	Ch'ston. Savann'h SUN Rises.	Ch'ston. Savann'h SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Frid.	4 47	7 25	4 52	7 20	4 56	7 16	5 0	7 12	5 7	7 5	5 14	6 58	5 19	6 53
2	Sat.	4 48	7 24	4 53	7 19	4 57	7 15	5 1	7 11	5 8	7 4	5 14	6 57	5 19	6 52
3	*SUN.*	4 49	7 22	4 54	7 18	4 58	7 14	5 1	7 10	5 8	7 3	5 15	6 56	5 20	6 51
4	Mond.	4 50	7 21	4 55	7 16	4 59	7 12	5 2	7 9	5 9	7 2	5 16	6 55	5 21	6 50
5	Tues.	4 51	7 20	4 56	7 15	5 0	7 11	5 3	7 8	5 10	7 1	5 16	6 54	5 21	6 49
6	Wed.	4 53	7 19	4 57	7 14	5 1	7 10	5 4	7 7	5 11	7 0	5 17	6 53	5 22	6 48
7	Thur.	4 54	7 17	4 58	7 13	5 2	7 9	5 5	7 6	5 12	6 59	5 18	6 52	5 22	6 48
8	Frid.	4 55	7 16	4 59	7 11	5 3	7 7	5 6	7 4	5 12	6 57	5 18	6 51	5 23	6 47
9	Sat.	4 56	7 14	5 0	7 10	5 4	7 6	5 7	7 3	5 13	6 56	5 19	6 50	5 23	6 46
10	*SUN.*	4 57	7 13	5 1	7 9	5 5	7 5	5 8	7 2	5 14	6 55	5 20	6 49	5 24	6 45
11	Mond.	4 58	7 12	5 2	7 8	5 6	7 4	5 9	7 0	5 15	6 54	5 21	6 48	5 25	6 44
12	Tues.	4 59	7 10	5 3	7 7	5 7	7 3	5 10	6 59	5 16	6 53	5 21	6 47	5 25	6 43
13	Wed.	5 1	7 9	5 4	7 5	5 8	7 1	5 11	6 58	5 17	6 52	5 22	6 46	5 26	6 42
14	Thur.	5 2	7 7	5 5	7 4	5 9	7 0	5 12	6 57	5 18	6 51	5 23	6 45	5 26	6 41
15	Frid.	5 3	7 5	5 6	7 2	5 10	6 58	5 13	6 55	5 18	6 49	5 23	6 44	5 27	6 40
16	Sat.	5 4	7 4	5 7	7 0	5 11	6 56	5 14	6 53	5 19	6 48	5 24	6 43	5 28	6 39
17	*SUN.*	5 5	7 2	5 8	6 59	5 12	6 55	5 15	6 52	5 20	6 47	5 25	6 42	5 28	6 38
18	Mond.	5 6	7 1	5 9	6 57	5 13	6 53	5 16	6 50	5 20	6 46	5 25	6 41	5 29	6 37
19	Tues.	5 8	6 59	5 10	6 55	5 14	6 52	5 17	6 49	5 21	6 45	5 26	6 40	5 29	6 36
20	Wed.	5 9	6 57	5 11	6 54	5 15	6 51	5 18	6 48	5 22	6 43	5 27	6 39	5 30	6 35
21	Thur.	5 10	6 56	5 12	6 52	5 16	6 49	5 19	6 46	5 23	6 42	5 27	6 38	5 30	6 34
22	Frid.	5 11	6 54	5 14	6 51	5 17	6 48	5 20	6 45	5 24	6 41	5 28	6 37	5 31	6 33
23	Sat.	5 12	6 53	5 15	6 50	5 18	6 47	5 21	6 44	5 25	6 40	5 29	6 36	5 32	6 32
24	*SUN.*	5 13	6 51	5 16	6 48	5 19	6 45	5 21	6 42	5 25	6 38	5 29	6 35	5 32	6 31
25	Mond.	5 14	6 49	5 17	6 47	5 20	6 44	5 22	6 41	5 26	6 37	5 30	6 34	5 33	6 30
26	Tues.	5 16	6 48	5 18	6 45	5 21	6 42	5 23	6 40	5 27	6 36	5 31	6 33	5 34	6 29
27	Wed.	5 17	6 46	5 19	6 44	5 22	6 41	5 24	6 38	5 28	6 35	5 31	6 32	5 34	6 28
28	Thur.	5 18	6 44	5 20	6 42	5 23	6 39	5 25	6 37	5 29	6 34	5 32	6 31	5 35	6 27
29	Frid.	5 19	6 42	5 21	6 40	5 24	6 38	5 26	6 36	5 30	6 32	5 33	6 29	5 35	6 26
30	Sat.	5 20	6 40	5 22	6 39	5 25	6 36	5 27	6 34	5 30	6 31	5 33	6 28	5 36	6 25
31	*SUN.*	5 21	6 39	5 23	6 37	5 26	6 35	5 28	6 33	5 31	6 29	5 34	6 26	5 36	6 24

Length and Decrease of Days.

Day of the Month.	Augusta. Portland. Length.	Augusta. Portland. Decr.	Boston. Albany. Length.	Boston. Albany. Decr.	New York. Philadelphia. Length.	New York. Philadelphia. Decr.	Washington. Baltimore. Length.	Washington. Baltimore. Decr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Decr.	Charleston. Savannah. Length.	Charleston. Savannah. Decr.	New Orleans. Mobile. Length.	New Orleans. Mobile. Decr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	14 38	0 54	14 28	0 49	14 20	0 45	14 12	0 41	13 58	0 37	13 44	0 33	13 34	0 29
3	14 33	0 59	14 24	0 53	14 16	0 49	14 9	0 44	13 55	0 40	13 41	0 36	13 31	0 32
5	14 29	1 4	14 19	0 58	14 12	0 53	14 5	0 48	13 51	0 44	13 38	0 39	13 28	0 35
7	14 24	1 9	14 15	1 2	14 8	0 57	14 1	0 52	13 47	0 48	13 34	0 43	13 26	0 37
9	14 19	1 14	14 10	1 7	14 3	1 2	13 56	0 57	13 43	0 52	13 31	0 46	13 23	0 40
11	14 13	1 19	14 6	1 11	13 58	1 7	13 51	1 2	13 39	0 56	13 27	0 50	13 19	0 44
13	14 8	1 24	14 1	1 16	13 54	1 11	13 47	1 6	13 35	1 0	13 24	0 53	13 16	0 47
15	14 3	1 29	13 56	1 21	13 49	1 16	13 42	1 11	13 31	1 4	13 21	0 56	13 13	0 50
17	13 58	1 34	13 51	1 26	13 44	1 21	13 37	1 16	13 27	1 8	13 17	1 0	13 10	0 53
19	13 52	1 40	13 45	1 32	13 39	1 26	13 32	1 21	13 23	1 12	13 14	1 3	13 7	0 56
21	13 46	1 46	13 40	1 37	13 34	1 31	13 27	1 26	13 19	1 16	13 11	1 6	13 4	0 59
23	13 41	1 52	13 35	1 42	13 29	1 36	13 23	1 30	13 15	1 20	13 7	1 10	13 1	1 2
25	13 35	1 57	13 30	1 47	13 24	1 41	13 19	1 34	13 11	1 24	13 4	1 13	12 57	1 6
27	13 29	2 3	13 25	1 52	13 19	1 46	13 14	1 39	13 7	1 28	13 1	1 16	12 54	1 9
29	13 23	2 9	13 19	1 58	13 14	1 51	13 10	1 43	13 3	1 32	12 57	1 20	12 51	1 12
31	13 17	2 15	13 14	2 3	13 9	1 56	13 5	1 48	12 58	1 37	12 52	1 25	12 48	1 15

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Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Rises.	Boston Albany. Rises.	N. York. Philada. Rises.	Was'ton. Bal'more. Rises	Raleigh. Nash'ville. Rises.	Ch'ston. Savannah. Rises.	N. Orl'ns. Mobile. Rises.	Moon south Washington.	Sidereal Time of the Sun's Semidiam. passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Frid.	3 17 m	3 23m	3 29m	3 35 m	3 41 m	3 47 m	3 53 m	10 47m	1 6.57	213	.580
2	Sat.	sets	sets	sets	sets	sets	sets	sets	11 34	1 6.48	214	.583
3	*SUN.*	7 12 a	7 9 a	7 7a	7 4 a	7 1 a	6 59 a	6 56 a	0 18 a	1 6.40	215	.586
4	Mon.	7 39	7 37	7 36	7 34	7 33	7 31	7 30	1 2	1 6 31	216	.589
5	Tues.	8 5	8 5	8 5	8 5	8 5	8 4	8 4	1 46	1 6.23	217	.591
6	Wed.	8 32	8 33	8 34	8 35	8 36	8 37	8 37	2 31	1 6.14	218	.594
7	Thur.	8 59	9 1	9 3	9 6	9 8	9 10	9 12	3 16	1 6.06	219	.597
8	Frid.	9 29	9 32	9 36	9 39	9 43	9 46	9 49	4 3	1 5.97	220	.600
9	Sat.	10 3	10 8	10 12	10 16	10 21	10 25	10 30	4 53	1 5.89	221	.602
10	*SUN.*	10 56	10 59	11 3	11 6	11 10	11 13	11 17	5 46	1 5.80	222	.605
11	Mon.	11 30	11 36	11 43	11 49	11 56	morn	morn	6 42	1 5.72	223	.608
12	Tues.	morn	morn	morn	morn	morn	0 2	0 8	7 41	1 5.64	224	.611
13	Wed.	0 26	0 33	0 39	0 46	0 53	1 0	1 7	8 41	1 5.56	225	.613
14	Thur.	1 30	1 37	1 43	1 50	1 57	2 3	2 10	9 42	1 5.48	226	.616
15	Frid.	2 41	2 47	2 53	2 59	3 5	3 11	3 17	10 41	1 5.41	227	.619
16	Sat.	3 57	4 2	4 6	4 11	4 16	4 20	4 25	11 38	1 5.33	228	.621
17	*SUN.*	rises	rises	rises	rises	rises	rises	rises	morn	1 5.26	229	.624
18	Mon.	7 17 a	7 17 a	7 17a	7 16 a	7 16 a	7 16 a	7 16 a	0 33	1 5.19	230	.627
19	Tues.	7 49	7 50	7 51	7 52	7 53	7 54	7 55	1 24	1 5.12	231	.630
20	Wed.	8 18	8 20	8 23	8 25	8 28	8 30	8 33	2 15	1 5.05	232	.632
21	Thur.	8 50	8 53	8 57	9 1	9 4	9 8	9 12	3 4	1 4.98	233	.635
22	Frid.	9 23	9 28	9 32	9 37	9 42	9 47	9 52	5 53	1 4.91	234	.638
23	Sat.	10 0	10 5	10 11	10 17	10 23	10 28	10 34	4 42	1 4.85	235	.641
24	*SUN.*	10 41	10 47	10 53	11 0	11 6	11 12	11 19	5 31	1 4.78	236	.643
25	Mon.	11 26	11 33	11 39	11 46	11 53	11 59	morn	6 19	1 4.72	237	.646
26	Tues.	morn	morn	morn	morn	morn	morn	0 6	7 8	1 4.66	238	.649
27	Wed.	0 16	0 23	0 29	0 36	0 42	0 49	0 55	7 56	1 4.61	239	.652
28	Thur.	1 10	1 16	1 22	1 28	1 34	1 40	1 46	8 43	1 4.55	240	.654
29	Frid.	2 7	2 13	2 18	2 23	2 29	2 34	2 39	9 29	1 4.50	241	.657
30	Sat.	3 6	3 11	3 15	3 19	3 24	3 28	3 33	10 15	1 4.45	242	.660
31	*SUN.*	4 6	4 9	4 12	4 16	4 19	4 22	4 25	11 0	1 4 40	243	.663

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d.	h.	m.		d.	h.	m.		d	h.
New Moon....	3	2	17 m.	Full Moon	17	8	9 m.	Perigee	15	5 a.
First Quarter .	10	5	32 a.	*Last Quarter* ..	24	1	19 a.	Apogee	27	6 a.

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Augusta. Portland. Ends	Boston. Albany. Begins	Boston. Albany. Ends	New York. Philadelphia. Begins	New York. Philadelphia. Ends	Washington. Baltimore. Begins	Washington. Baltimore. Ends	Raleigh. Nashville. Begins	Raleigh. Nashville. Ends	Charleston. Savannah. Begins	Charleston. Savannah. Ends	New Orleans. Mobile. Begins	New Orleans. Mobile. Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	2 44	9 28	2 55	9 17	3 6	9 6	3 14	8 58	3 26	8 45	3 39	8 33	3 48	8 24
6	2 54	9 17	3 5	9 7	3 14	8 57	3 20	8 50	3 32	8 38	3 44	8 26	3 53	8 17
11	3 3	9 7	3 14	8 57	3 21	8 48	3 27	8 42	3 37	8 31	3 48	8 20	3 47	8 11
16	3 12	8 56	3 21	8 48	3 29	8 40	3 34	8 34	3 44	8 24	3 53	8 14	4 1	8 5
21	3 21	8 45	3 28	8 38	3 36	8 31	3 41	8 26	3 49	8 16	3 58	8 7	4 5	7 59
26	3 29	8 34	3 36	8 28	3 43	8 21	3 47	8 17	3 54	8 8	4 2	8 0	4 9	7 53
31	3 38	8 22	3 42	8 18	3 49	8 12	3 52	8 9	4 0	8 1	4 7	7 53	4 13	7 47

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville SUN Rises.	Raleigh. Nashville SUN Sets.	Ch'ston. Savann'h SUN Rises.	Ch'ston. Savann'h SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Mond.	5 23	6 37	5 24	6 35	5 27	6 33	5 29	6 31	5 32	6 28	5 35	6 25	5 37	6 23
2	Tues.	5 24	6 35	5 26	6 33	5 28	6 31	5 30	6 29	5 33	6 27	5 35	6 24	5 37	6 22
3	Wed.	5 25	6 33	5 27	6 32	5 29	6 30	5 31	6 28	5 34	6 25	5 36	6 22	5 38	6 21
4	Thur.	5 26	6 31	5 28	6 30	5 30	6 28	5 32	6 26	5 35	6 23	5 37	6 21	5 38	6 19
5	Frid.	5 27	6 30	5 29	6 28	5 31	6 26	5 33	6 24	5 35	6 22	5 37	6 20	5 39	6 18
6	Sat.	5 28	6 28	5 30	6 26	5 32	6 24	5 34	6 23	5 36	6 21	5 38	6 19	5 39	6 17
7	*SUN.*	5 30	6 26	5 31	6 25	5 33	6 23	5 35	6 21	5 37	6 19	5 38	6 18	5 40	6 16
8	Mond.	5 31	6 24	5 32	6 23	5 34	6 21	5 35	6 20	5 37	6 18	5 39	6 16	5 40	6 15
9	Tues.	5 32	6 22	5 33	6 21	5 35	6 19	5 36	6 18	5 38	6 16	5 40	6 15	5 41	6 13
10	Wed.	5 33	6 20	5 35	6 19	5 36	6 17	5 37	6 16	5 39	6 15	5 40	6 14	5 42	6 12
11	Thur.	5 34	6 19	5 36	6 17	5 37	6 16	5 38	6 15	5 40	6 13	5 41	6 12	5 42	6 11
12	Frid.	5 35	6 17	5 37	6 15	5 38	6 14	5 39	6 13	5 41	6 12	5 42	6 11	5 43	6 10
13	Sat.	5 37	6 15	5 38	6 14	5 39	6 13	5 40	6 12	5 41	6 10	5 42	6 9	5 43	6 8
14	*SUN.*	5 38	6 13	5 39	6 12	5 40	6 11	5 41	6 10	5 42	6 9	5 43	6 8	5 44	6 7
15	Mond.	5 39	6 11	5 40	6 10	5 41	6 9	5 41	6 9	5 42	6 8	5 43	6 7	5 44	6 6
16	Tues.	5 40	6 9	5 41	6 8	5 42	6 7	5 42	6 7	5 43	6 6	5 44	6 6	5 45	6 5
17	Wed.	5 41	6 7	5 42	6 6	5 43	6 5	5 43	6 5	5 44	6 5	5 45	6 5	5 45	6 4
18	Thur.	5 42	6 6	5 43	6 5	5 44	6 4	5 44	6 4	5 45	6 4	5 45	6 4	5 46	6 3
19	Frid.	5 44	6 4	5 44	6 3	5 44	6 2	5 44	6 2	5 45	6 3	5 46	6 3	5 46	6 2
20	Sat.	5 45	6 2	5 45	6 1	5 45	6 0	5 45	6 0	5 46	6 1	5 47	6 1	5 47	6 1
21	*SUN.*	5 46	6 0	5 46	6 0	5 46	5 59	5 46	5 59	5 47	6 0	5 47	6 0	5 47	6 0
22	Mond.	5 47	5 58	5 47	5 58	5 47	5 57	5 47	5 57	5 48	5 58	5 48	5 59	5 48	5 58
23	Tues.	5 48	5 56	5 48	5 56	5 48	5 56	5 48	5 56	5 48	5 57	5 48	5 57	5 48	5 57
24	Wed.	5 49	5 54	5 50	5 55	5 49	5 54	5 49	5 54	5 49	5 55	5 49	5 55	5 49	5 55
25	Thur.	5 50	5 52	5 51	5 53	5 50	5 53	5 50	5 53	5 50	5 54	5 50	5 54	5 50	5 54
26	Frid.	5 52	5 51	5 52	5 51	5 51	5 51	5 51	5 51	5 51	5 52	5 50	5 53	5 50	5 53
27	Sat.	5 53	5 49	5 53	5 49	5 52	5 49	5 52	5 49	5 51	5 50	5 51	5 51	5 51	5 51
28	*SUN.*	5 54	5 47	5 54	5 47	5 53	5 48	5 53	5 48	5 52	5 48	5 52	5 50	5 51	5 50
29	Mond.	5 55	5 45	5 55	5 46	5 54	5 46	5 54	5 46	5 53	5 47	5 52	5 48	5 52	5 49
30	Tues.	5 57	5 43	5 56	5 44	5 55	5 45	5 53	5 45	5 54	5 46	5 53	5 47	5 52	5 48

Length and Decrease of Days.

Day of the Month.	Augusta. Portland. Length.	Augusta. Portland. Decr.	Boston. Albany. Length.	Boston. Albany. Decr.	New York. Philadelphia. Length.	New York. Philadelphia. Decr.	Washington. Baltimore. Length.	Washington. Baltimore. Decr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Decr.	Charleston. Savannah. Length.	Charleston. Savannah. Decr.	New Orleans. Mobile. Length.	New Orleans. Mobile. Decr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	13 14	2 18	13 11	2 6	13 6	1 59	13 2	1 51	12 56	1 39	12 50	1 27	12 46	1 17
3	13 9	2 24	13 5	2 12	13 1	2 4	12 57	1 56	12 51	1 44	12 46	1 31	12 43	1 20
5	13 3	2 30	12 59	2 18	12 55	2 10	12 51	2 2	12 47	1 48	12 43	1 34	12 39	1 24
7	12 57	2 36	12 54	2 23	12 50	2 15	12 46	2 7	12 43	1 52	12 40	1 37	12 36	1 27
9	12 51	2 42	12 48	2 29	12 44	2 21	12 41	2 12	12 38	1 57	12 36	1 41	12 32	1 31
11	12 45	2 48	12 42	2 35	12 39	2 26	12 37	2 16	12 34	2 1	12 32	1 45	12 29	1 34
13	12 39	2 54	12 36	2 41	12 34	2 31	12 32	2 21	12 30	2 5	12 28	1 49	12 25	1 38
15	12 32	3 0	12 30	2 47	12 28	2 37	12 27	2 26	12 26	2 9	12 24	1 53	12 22	1 41
17	12 26	3 6	12 24	2 53	12 23	2 42	12 22	2 31	12 22	2 13	12 20	1 57	12 19	1 44
19	12 20	3 12	12 19	2 58	12 18	2 47	12 18	2 35	12 17	2 18	12 16	2 1	12 16	1 47
21	12 14	3 18	12 14	3 3	12 13	2 52	12 13	2 40	12 13	2 22	12 12	2 5	12 13	1 50
23	12 8	3 24	12 8	3 9	12 8	2 57	12 8	2 45	12 8	2 27	12 8	2 9	12 9	1 54
25	12 2	3 30	12 2	3 15	12 2	3 3	12 2	2 51	12 3	2 32	12 4	2 13	12 5	1 58
27	11 56	3 36	11 56	3 21	11 57	3 8	11 57	2 56	11 59	2 36	12 0	2 17	12 1	2 2
29	11 50	3 42	11 51	3 26	11 52	3 13	11 52	3 1	11 54	2 41	11 56	2 21	11 57	2 6
30	11 47	3 45	11 48	3 29	11 49	3 16	11 50	3 3	11 52	2 43	11 54	2 23	11 56	2 7

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Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Sets.	Boston Albany. Sets.	N. York. Philada. Sets.	Was'ton. Bal'more. Sets	Raleigh. Nash'ville. Sets.	Cha'ston. Savannah. Sets.	N. Orl'ns. Mobile. Sets.	Moon south Washington.	Sidereal Time of the Sun's Semidiameter passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Mon.	eve.	eve	eve.	eve.	eve.	eve.	eve.	11 44m	1 4.35	244	.665
2	Tues.	6 36	6 37	6 37	6 38	6 38	6 39	6 39	0 29a	1 4.31	245	.668
3	Wed.	7 4	7 6	7 7	7 9	7 11	7 13	7 4	1 14	1 4.27	246	.671
4	Thur.	7 33	7 36	7 39	7 42	7 45	7 48	7 52	2 1	1 4.24	247	.674
5	Frid.	8 6	8 10	8 15	8 19	8 23	8 27	8 32	2 51	1 4.20	248	.676
6	Sat.	8 44	8 49	8 55	9 0	9 5	9 11	9 16	3 42	1 4.17	249	.679
7	*SUN.*	9 28	9 34	9 40	9 46	9 53	9 59	10 5	4 37	1 4.14	250	.682
8	Mon.	10 20	10 26	10 33	10 40	10 46	10 53	10 59	5 34	1 4.11	251	.684
9	Tues.	11 19	11 26	11 33	11 39	11 46	11 52	11 59	6 32	1 4.09	252	.687
10	Wed.	morn	morn	morn	morn	morn	morn	morn	7 31	1 4.07	253	.690
11	Thur.	0 26	0 32	0 38	0 44	0 50	0 56	1 2	8 28	1 4.05	254	.693
12	Frid.	1 37	1 42	1 48	1 53	1 58	2 3	2 8	9 24	1 4.04	255	.695
13	Sat.	2 51	2 55	2 58	3 2	3 6	3 10	3 14	10 19	1 4.03	256	.698
14	*SUN.*	4 5	4 7	4 10	4 12	4 14	4 17	4 19	11 11	1 4.02	257	.701
15	Mon.	rises	rises	rises	rises	rises	rises	rises	morn	1 4.02	258	.704
16	Tues.	6 15a	6 17a	6 19a	6 21a	6 23a	6 25a	6 27a	0 2	1 4.01	259	.706
17	Wed.	6 46	6 50	6 53	6 56	6 59	7 2	7 6	0 53	1 4.01	260	.709
18	Thur.	7 26	7 24	7 28	7 33	7 37	7 41	7 46	1 42	1 4.01	261	.712
19	Frid.	7 56	8 1	8 7	8 12	8 18	8 23	8 28	2 32	1 4.02	262	.715
20	Sat.	8 36	8 42	8 49	8 55	9 1	9 7	9 13	3 22	1 4.02	263	.717
21	*SUN.*	9 21	9 27	9 34	9 40	9 46	9 53	9 59	4 12	1 4.03	264	.720
22	Mon.	10 9	10 16	10 22	10 29	10 35	10 42	10 48	5 1	1 4.05	265	.723
23	Tues.	11 2	11 8	11 14	11 21	11 27	11 33	11 39	5 49	1 4.07	266	.726
24	Wed.	11 57	morn	morn	morn	morn	morn	morn	6 37	1 4.09	267	.728
25	Thur.	morn	0 3	0 9	0 14	0 20	0 25	0 31	7 23	1 4.11	268	.731
26	Frid.	0 56	1 0	1 5	1 10	1 14	1 19	1 24	8 9	1 4.14	269	.734
27	Sat.	1 55	1 59	2 3	2 6	2 10	2 14	2 17	8 54	1 4.17	270	.736
28	*SUN.*	2 56	2 59	3 1	3 4	3 6	3 9	3 12	9 38	1 4.20	271	.739
29	Mon.	3 59	4 0	4 1	4 3	4 4	4 5	4 7	10 23	1 4.23	272	.742
30	Tues.	5 2	5 3	5 3	5 3	5 3	5 3	5 3	11 9	1 4.27	273	.745

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d.	h.	m.		d.	h.	m.		d.	h.
New Moon....	1	4	27 a.	Full Moon	15	5	5 a	Perigee	12	1 a.
First Quarter .	9	0	16 m.	*Last Quarter* ..	23	7	18 m.	Apogee	24	0 a.

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Augusta. Portland. Ends	Boston. Albany. Begins	Boston. Albany. Ends	New York. Philadelphia. Begins	New York. Philadelphia. Ends	Washington. Baltimore. Begins	Washington. Baltimore. Ends	Raleigh. Nashville. Begins	Raleigh. Nashville. Ends	Charleston. Savannah. Begins	Charleston. Savannah. Ends	New Orleans. Mobile. Begins	New Orleans. Mobile. Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	3 39	8 21	3 44	8 16	3 50	8 10	3 54	8 6	4 1	7 59	4 8	7 52	4 14	7 46
6	3 47	8 9	3 50	8 6	3 56	8 1	3 59	7 57	4 6	7 50	4 12	7 44	4 17	7 39
11	3 54	7 59	3 56	7 56	4 1	7 52	4 5	7 48	4 11	7 42	4 16	7 37	4 20	7 33
16	4 1	7 48	4 2	7 46	4 7	7 43	4 11	7 39	4 16	7 34	4 20	7 29	4 24	7 27
21	4 8	7 38	4 9	7 36	4 13	7 34	4 17	7 30	4 21	7 26	4 24	7 22	4 27	7 20
26	4 15	7 28	4 16	7 27	4 19	7 25	4 22	7 21	4 25	7 18	4 28	7 15	4 30	7 13
30	4 16	7 23	4 22	7 18	4 23	7 17	4 25	7 14	4 28	7 11	4 31	7 9	4 33	7 7

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville SUN Rises.	Raleigh. Nashville SUN Sets.	Ch'ston. Savann'h SUN Rises.	Ch'ston. Savann'h SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Wed.	5 58	5 41	5 57	5 42	5 56	5 43	5 56	5 43	5 55	5 44	5 54	5 45	5 53	5 46
2	Thur.	5 59	5 40	5 58	5 40	5 57	5 41	5 57	5 41	5 56	5 42	5 55	5 43	5 54	5 44
3	Frid.	6 0	5 38	5 59	5 39	5 58	5 40	5 58	5 40	5 56	5 41	5 56	5 42	5 54	5 43
4	Sat.	6 1	5 36	6 1	5 37	6 0	5 38	5 59	5 38	5 57	5 40	5 56	5 41	5 55	5 42
5	*SUN.*	6 3	5 34	6 2	5 36	6 1	5 37	6 0	5 37	5 58	5 39	5 57	5 40	5 56	5 41
6	Mond.	6 4	5 32	6 3	5 34	6 2	5 35	6 1	5 35	5 59	5 37	5 57	5 39	5 56	5 40
7	Tues.	6 5	5 30	6 4	5 32	6 3	5 33	6 2	5 34	6 0	5 36	5 58	5 37	5 57	5 39
8	Wed.	6 6	5 29	6 5	5 31	6 4	5 32	6 3	5 32	6 1	5 34	5 59	5 36	5 58	5 38
9	Thur.	6 7	5 27	6 6	5 29	6 5	5 30	6 4	5 31	6 1	5 33	5 59	5 35	5 58	5 37
10	Frid.	6 9	5 25	6 8	5 27	6 6	5 28	6 5	5 29	6 2	5 32	6 0	5 34	5 59	5 36
11	Sat.	6 10	5 23	6 9	5 26	6 7	5 27	6 6	5 28	6 3	5 31	6 1	5 33	6 0	5 35
12	*SUN.*	6 11	5 22	6 10	5 24	6 8	5 25	6 7	5 26	6 4	5 29	6 1	5 31	6 0	5 33
13	Mond.	6 12	5 20	6 11	5 22	6 9	5 24	6 8	5 25	6 5	5 28	6 2	5 30	6 1	5 32
14	Tues.	6 14	5 18	6 12	5 21	6 10	5 22	6 9	5 23	6 6	5 26	6 3	5 29	6 2	5 31
15	Wed.	6 15	5 17	6 13	5 19	6 11	5 21	6 10	5 22	6 6	5 25	6 3	5 28	6 2	5 30
16	Thur.	6 16	5 15	6 14	5 17	6 12	5 19	6 11	5 20	6 7	5 23	6 4	5 26	6 3	5 28
17	Frid.	6 18	5 13	6 15	5 15	6 13	5 17	6 12	5 19	6 8	5 22	6 5	5 25	6 4	5 27
18	Sat.	6 19	5 12	6 17	5 14	6 15	5 16	6 13	5 18	6 9	5 21	6 6	5 24	6 4	5 26
19	*SUN.*	6 20	5 10	6 18	5 12	6 16	5 14	6 14	5 16	6 10	5 20	6 7	5 23	6 5	5 25
20	Mond.	6 21	5 8	6 19	5 11	6 17	5 13	6 15	5 15	6 11	5 19	6 8	5 22	6 6	5 24
21	Tues.	6 23	5 7	6 20	5 9	6 18	5 12	6 16	5 14	6 12	5 18	6 8	5 21	6 6	5 23
22	Wed.	6 24	5 5	6 21	5 8	6 19	5 11	6 17	5 13	6 13	5 17	6 9	5 20	6 7	5 22
23	Thur.	6 25	5 3	6 22	5 6	6 20	5 9	6 18	5 11	6 14	5 15	6 10	5 19	6 8	5 21
24	Frid.	6 27	5 2	6 23	5 5	6 21	5 8	6 19	5 10	6 15	5 14	6 11	5 18	6 8	5 20
25	Sat.	6 28	5 0	6 25	5 3	6 22	5 6	6 20	5 9	6 16	5 13	6 12	5 17	6 9	5 19
26	*SUN.*	6 29	4 59	6 26	5 2	6 23	5 5	6 21	5 8	6 17	5 12	6 13	5 16	6 10	5 18
27	Mond.	6 31	4 57	6 27	5 0	6 24	5 3	6 22	5 6	6 18	5 11	6 14	5 15	6 10	5 17
28	Tues.	6 32	4 56	6 28	4 59	6 25	5 2	6 23	5 5	6 19	5 10	6 15	5 14	6 11	5 16
29	Wed.	6 33	4 54	6 29	4 57	6 26	5 0	6 24	5 3	6 20	5 8	6 16	5 13	6 12	5 15
30	Thur.	6 35	4 53	6 30	4 55	6 27	4 59	6 25	5 2	6 20	5 7	6 16	5 12	6 12	5 14
31	Frid.	6 36	4 51	6 32	4 54	6 29	4 58	6 26	5 1	6 21	5 6	6 17	5 11	6 13	5 13

Length and Decrease of Days.

	Augusta. Portland. Length.	Augusta. Portland. Decr.	Boston. Albany. Length.	Boston. Albany. Decr.	New York. Philadelphia. Length.	New York. Philadelphia. Decr.	Washington. Baltimore. Length.	Washington. Baltimore. Decr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Decr.	Charleston. Savannah. Length.	Charleston. Savannah. Decr.	New Orleans. Mobile. Length.	New Orleans. Mobile. Decr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	11 44	3 48	11 45	3 32	11 46	3 19	11 47	3 6	11 49	2 46	11 51	2 26	11 53	2 10
3	11 38	4 25	11 41	3 37	11 41	3 24	11 42	3 11	11 45	2 50	11 47	2 30	11 49	2 14
5	11 32	4 1	11 34	3 43	11 36	3 29	11 37	3 16	11 40	2 55	11 43	2 34	11 45	2 18
7	11 26	4 7	11 28	3 49	11 30	3 35	11 32	3 21	11 36	2 59	11 39	2 38	11 42	2 21
9	11 20	4 13	11 23	3 54	11 25	3 40	11 27	3 26	11 32	3 3	11 36	2 41	11 39	2 24
11	11 14	4 19	11 17	4 0	11 20	3 45	11 22	3 31	11 27	3 8	11 32	2 45	11 35	2 28
13	11 8	4 25	11 11	4 6	11 14	3 51	11 17	3 36	11 23	3 12	11 28	2 49	11 31	2 32
15	11 2	4 31	11 6	4 11	11 9	3 56	11 12	3 41	11 18	3 17	11 24	2 53	11 28	2 35
17	10 56	4 36	11 0	4 17	11 4	4 1	11 7	3 46	11 14	3 21	11 20	2 57	11 24	2 39
19	10 50	4 42	10 54	4 23	10 58	4 7	11 2	3 51	11 9	3 26	11 16	3 1	11 20	2 43
21	10 44	4 48	10 49	4 28	10 54	4 11	10 58	3 56	11 5	3 30	11 13	3 4	11 17	2 46
23	10 38	4 54	10 44	4 33	10 49	4 16	10 53	4 0	11 1	3 34	11 9	3 8	11 13	2 50
25	10 32	5 0	10 38	4 39	10 44	4 21	10 49	4 4	10 57	3 38	11 5	3 12	11 10	2 53
27	10 27	5 5	10 33	4 44	10 39	4 26	10 44	4 9	10 53	3 42	11 1	3 16	11 7	2 56
29	10 21	5 11	10 28	4 49	10 34	4 31	10 39	4 14	10 48	3 47	10 57	3 20	11 3	3 0
31	10 16	5 17	10 22	4 55	10 29	4 36	10 35	4 18	10 44	3 51	10 54	3 23	11 0	3 3

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Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Sets.	Boston Albany. Sets.	N. York. Philada. Sets.	Was'ton. Bal'more. Sets	Raleigh. Nash'ville. Sets.	Cha'ton. Savannah. Sets.	N. Orl'ns. Mobile. Sets.	Moon south Washington.	Sidereal Time of the South Semidiam. passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Wed.	eve.	eve	eve.	eve.	eve.	eve.	eve.	11 57m	1 4.31	274	.747
2	Thur.	6 7	6 11	6 15	6 19	6 23	6 26	6 30	0 46a	1 4.36	275	.750
3	Frid.	6 44	6 49	6 54	6 59	7 4	7 9	7 14	1 38	1 4.41	276	.753
4	Sat.	7 27	7 33	7 39	7 45	7 51	7 57	8 3	2 32	1 4.46	277	.756
5	*SUN.*	8 17	8 23	8 30	8 36	8 43	8 49	8 56	3 29	1 4.51	278	.758
6	Mon.	9 14	9 21	9 27	9 34	9 41	9 47	9 54	4 27	1 4.57	279	.761
7	Tues.	10 18	10 24	10 31	10 37	10 43	10 49	10 55	5 25	1 4.63	280	.764
8	Wed.	11 27	11 32	11 37	11 43	11 48	11 53	11 59	6 22	1 4.69	281	.767
9	Thur.	morn	morn	morn	morn	morn	morn	morn	7 17	1 4.75	282	.769
10	Frid.	0 38	0 42	0 46	0 50	0 55	0 59a	1 3	8 11	1 4.82	283	.772
11	Sat.	1 49	1 52	1 55	1 58	2 1	2 4	2 7	9 2	1 4.89	284	.775
12	*SUN.*	3 0	3 1	3 3	3 5	3 6	3 8	3 10	9 53	1 4.97	285	.778
13	Mon.	4 11	4 11	4 11	4 11	4 11	4 11	4 12	10 43	1 5.05	286	.780
14	Tues.	rises	rises	rises	rises	rises	rises	rises	11 32	1 5.13	287	.783
15	Wed.	5 17 a	5 20 a	5 24a	5 28 a	5 32 a	5 36 a	5 40 a	morn	1 5.21	288	.786
16	Thur.	5 52	5 57	6 1	6 6	6 11	6 16	6 21	0 20	1 5.29	289	.789
17	Frid.	6 31	6 36	6 42	6 48	6 54	6 59	7 5	1 12	1 5.37	290	.791
18	Sat.	7 14	7 20	7 26	7 32	7 39	7 45	7 51	2 2	1 5.46	291	.794
19	*SUN.*	8 1	8 8	8 14	8 20	8 27	8 33	8 40	2 52	1 5.55	292	.797
20	Mon.	8 53	8 59	9 5	9 11	9 18	9 24	9 30	3 41	1 5.64	293	.799
21	Tues.	9 47	9 53	9 59	10 5	10 10	10 16	10 22	4 29	1 5.73	294	.802
22	Wed.	10 44	10 49	10 54	10 59	11 4	11 9	11 14	5 16	1 5.83	295	.805
23	Thur.	11 43	11 47	11 51	11 55	11 59	morn	morn	6 2	1 5.93	296	.808
24	Frid.	morn	morn	morn	morn	morn	0 3	0 7	6 47	1 6.03	297	.810
25	Sat.	0 42	0 45	0 48	0 51	0 54	0 57	1 0	7 31	1 6.13	298	.813
26	*SUN.*	1 43	1 45	1 47	1 49	1 51	1 52	1 54	8 15	1 6.24	299	.816
27	Mon.	2 46	2 47	2 47	2 48	2 48	2 49	2 50	9 0	1 6.34	300	.819
28	Tues.	3 50	3 50	3 49	3 49	3 48	3 48	3 47	9 47	1 6.45	301	.821
29	Wed.	4 59	4 57	4 55	4 53	4 50	4 48	4 46	10 36	1 6.56	302	.824
30	Tuur.	sets	sets	sets	sets	sets	sets	sets	11 28	1 6.67	303	.827
31	Frid.	5 22 a	5 27 a	5 33a	5 39 a	5 44 a	5 50 a	5 55 a	0 22 a	1 6.78	304	.830

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d.	h.	m.		d.	h.	m.		d.	h.	
New Moon....	1	5	51 m.	Full Moon	15	4	48 m.	Perigee	8	0	a.
First Quarter .	8	6	23 m.	*Last Quarter* ..	23	3	6 m.	Apogee	22	9	m.
				New Moon	30	6	34 a.				

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Ends	Boston. Albany. Begins	Ends	New York. Philadelphia. Begins	Ends	Washington. Baltimore. Begins	Ends	Raleigh. Nashville. Begins	Ends	Charleston. Savannah. Begins	Ends	New Orleans. Mobile. Begins	Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	4 21	7 18	4 23	7 17	4 25	7 16	4 27	7 13	4 30	7 10	4 32	7 8	4 34	7 6
6	4 26	7 10	4 29	7 7	4 31	7 5	4 32	7 4	4 34	7 2	4 35	7 1	4 37	6 59
11	4 33	7 0	4 35	6 58	4 36	6 56	4 37	6 56	4 38	6 55	4 38	6 55	4 40	6 53
16	4 39	6 52	4 40	6 50	4 41	6 48	4 42	6 49	4 42	6 49	4 42	6 49	4 43	6 48
21	4 46	6 44	4 46	6 43	4 46	6 41	4 47	6 43	4 46	6 44	4 46	6 44	4 46	6 43
26	4 52	6 37	4 51	6 37	4 51	6 36	4 52	6 37	4 51	6 38	4 50	6 39	4 49	6 39
31	4 57	6 30	4 57	6 31	4 56	6 32	4 57	6 31	4 55	6 33	4 54	6 35	4 52	6 36

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville SUN Rises.	Raleigh. Nashville SUN Sets.	Ch'ston. Savann'h SUN Rises.	Ch'ston. Savann'h SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Sat.	6 37	4 50	6 33	4 53	6 30	4 57	6 27	5 0	6 22	5 5	6 18	5 10	6 14	5 13
2	*SUN.*	6 39	4 49	6 34	4 52	6 31	4 56	6 28	4 59	6 23	5 4	6 19	5 9	6 15	5 12
3	Mond.	6 40	4 47	6 35	4 51	6 32	4 55	6 29	4 58	6 24	5 3	6 20	5 8	6 16	5 11
4	Tues.	6 41	4 46	6 36	4 50	6 33	4 54	6 30	4 57	6 25	5 2	6 21	5 7	6 17	5 10
5	Wed.	6 43	4 45	6 38	4 49	6 34	4 53	6 31	4 56	6 26	5 2	6 22	5 7	6 17	5 10
6	Thur.	6 44	4 44	6 39	4 47	6 35	4 51	6 32	4 55	6 27	5 1	6 23	5 6	6 18	5 9
7	Frid.	6 45	4 42	6 40	4 46	6 36	4 50	6 33	4 54	6 28	5 0	6 24	5 5	6 19	5 8
8	Sat.	6 47	4 41	6 42	4 45	6 38	4 49	6 35	4 53	6 30	4 59	6 25	5 4	6 20	5 8
9	*SUN.*	6 48	4 40	6 43	4 44	6 39	4 48	6 36	4 52	6 31	4 58	6 26	5 3	6 20	5 7
10	Mond.	6 49	4 39	6 44	4 43	6 40	4 47	6 37	4 51	6 32	4 57	6 27	5 2	6 21	5 6
11	Tues.	6 51	4 38	6 46	4 42	6 42	4 46	6 39	4 50	6 33	4 56	6 28	5 2	6 22	5 6
12	Wed.	6 52	4 37	6 47	4 41	6 43	4 45	6 40	4 49	6 34	4 55	6 29	5 1	6 23	5 5
13	Thur.	6 53	4 36	6 48	4 40	6 44	4 44	6 41	4 48	6 35	4 54	6 30	5 0	6 24	5 5
14	Frid.	6 55	4 35	6 50	4 39	6 46	4 43	6 42	4 47	6 36	4 54	6 31	5 0	6 25	5 4
15	Sat.	6 56	4 34	6 51	4 38	6 47	4 42	6 43	4 46	6 37	4 53	6 32	4 59	6 26	5 4
16	*SUN.*	6 57	4 33	6 52	4 37	6 48	4 41	6 44	4 45	6 38	4 52	6 32	4 58	6 26	5 3
17	Mond.	6 59	4 32	6 53	4 36	6 49	4 40	6 45	4 44	6 39	4 51	6 33	4 58	6 27	5 3
18	Tues.	7 0	4 31	6 54	4 35	6 50	4 40	6 46	4 44	6 40	4 51	6 34	4 57	6 28	5 2
19	Wed.	7 1	4 30	6 55	4 34	6 51	4 39	6 47	4 43	6 41	4 50	6 35	4 56	6 29	5 2
20	Thur.	7 3	4 29	6 57	4 34	6 52	4 38	6 48	4 42	6 42	4 49	6 36	4 56	6 29	5 2
21	Frid.	7 4	4 29	6 58	4 33	6 53	4 38	6 49	4 42	6 42	4 49	6 36	4 55	6 30	5 1
22	Sat.	7 5	4 28	6 59	4 32	6 54	4 37	6 50	4 41	6 43	4 48	6 37	4 55	6 31	5 1
23	*SUN.*	7 6	4 27	7 0	4 31	6 55	4 36	6 51	4 41	6 44	4 48	6 38	4 55	6 32	5 1
24	Mond.	7 8	4 26	7 2	4 31	6 57	4 36	6 52	4 41	6 45	4 47	6 39	4 54	6 33	5 0
25	Tues.	7 9	4 26	7 3	4 30	6 58	4 35	6 53	4 40	6 46	4 47	6 40	4 54	6 34	5 0
26	Wed.	7 10	4 25	7 4	4 30	6 59	4 35	6 54	4 40	6 47	4 47	6 40	4 54	6 34	5 0
27	Thur.	7 11	4 25	7 5	4 29	7 0	4 35	6 55	4 40	6 48	4 47	6 41	4 54	6 35	5 0
28	Frid.	7 13	4 24	7 6	4 29	7 1	4 35	6 56	4 40	6 49	4 47	6 42	4 54	6 36	5 0
29	Sat.	7 14	4 24	7 8	4 29	7 3	4 35	6 58	4 40	6 50	4 47	6 43	4 54	6 37	5 0
30	*SUN.*	7 15	4 23	7 9	4 28	7 4	4 34	6 59	4 39	6 51	4 47	6 44	4 54	6 38	5 0

Length and Decrease of Days.

Day of the Month.	Augusta. Portland. Length.	Augusta. Portland. Decr.	Boston. Albany. Length.	Boston. Albany. Decr.	New York. Philadelphia. Length.	New York. Philadelphia. Decr.	Washington. Baltimore. Length.	Washington. Baltimore. Decr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Decr.	Charleston. Savannah. Length.	Charleston. Savannah. Decr.	New Orleans. Mobile. Length.	New Orleans. Mobile. Decr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	10 13	5 19	10 20	4 57	10 27	4 38	10 33	4 20	10 43	3 52	10 52	3 25	10 59	3 4
3	10 8	5 25	10 16	5 1	10 23	4 42	10 29	4 24	10 39	3 56	10 48	2 28	10 55	3 8
5	10 2	5 30	10 11	5 6	10 18	4 47	10 25	4 28	10 35	4 0	10 45	3 32	10 53	3 10
7	9 57	5 35	10 6	5 11	10 14	4 51	10 21	4 32	10 31	4 4	10 41	3 36	10 49	3 14
9	9 52	5 40	10 1	5 16	10 9	4 56	10 16	4 37	10 27	4 8	10 37	3 40	10 47	3 16
11	9 47	5 45	9 59	5 18	10 5	5 0	10 11	4 42	10 23	4 12	10 34	3 43	10 44	3 19
13	9 42	5 50	9 52	5 25	10 0	5 5	10 7	4 46	10 19	4 16	10 30	3 47	10 41	3 22
15	9 37	5 55	9 47	5 30	9 55	5 10	10 3	4 50	10 15	4 20	10 27	3 50	10 38	3 25
17	9 33	5 59	9 43	5 34	9 51	5 14	9 59	4 54	10 12	4 23	10 25	3 52	10 36	3 27
19	9 29	6 4	9 39	5 38	9 48	5 17	9 56	4 57	10 19	4 16	10 21	3 56	10 33	3 30
21	9 25	6 8	9 35	5 42	9 44	5 21	9 53	5 0	10 6	4 29	10 19	3 58	10 31	3 32
23	9 21	6 12	9 31	5 46	9 41	5 24	9 50	5 3	10 4	4 31	10 17	4 0	10 29	3 34
25	9 17	6 16	9 27	5 50	9 37	5 28	9 47	5 6	10 1	4 34	10 14	4 3	10 26	3 37
27	9 13	6 19	9 24	5 53	9 35	5 30	9 45	5 8	9 59	4 36	10 13	4 4	10 25	3 38
29	9 10	6 23	9 21	5 56	9 32	5 33	9 42	5 11	9 57	4 38	10 11	4 6	10 23	3 40
30	9 8	6 24	9 19	5 58	9 30	5 35	9 40	5 13	9 55	4 40	10 10	4 7	10 22	3 41

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Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Sets.	Boston Albany. Sets.	N. York. Philada. Sets.	Was'ton. Bal'more. Sets	Raleigh. Nash'ille Sets.	Cha'ston. Savannah. Sets.	N. Orl'ns. Mobile. Sets.	Moon south Washington.	Sidereal Time of the Sun's ascension, reckoning the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Sat.	6 8 a	6 15 a	6 21 a	6 27 a	6 33 a	6 40 a	6 46 a	1 18 a	1 6.10	305	.832
2	*SUN.*	7 7	7 13	7 20	7 26	7 33	7 40	7 46	2 19	1 7.01	306	.835
3	Mon.	8 10	8 16	8 23	8 29	8 36	8 42	8 48	3 19	1 7.15	307	.838
4	Tues.	9 19	9 24	9 30	9 35	9 41	9 47	9 52	4 18	1 7.24	308	.841
5	Wed.	10 29	10 34	10 38	10 43	10 47	10 51	10 56	5 14	1 7.30	309	.843
6	Thur.	11 40	11 43	11 47	11 50	11 53	11 56	11 59	6 7	1 7.47	310	.846
7	Frid.	morn	morn	morn	morn	morn	morn	morn	6 59	1 7.55	311	.849
8	Sat.	0 51	0 53	0 55	0 57	0 59	1 1	1 3	7 48	1 7.71	312	.851
9	*SUN.*	2 0	2 0	2 1	2 1	2 2	2 3	2 3	8 37	1 7.83	313	.854
10	Mon.	3 8	3 7	3 6	3 5	3 5	3 4	3 3	9 25	1 7.95	314	.857
11	Tues.	4 15	4 13	4 11	4 9	4 7	4 5	4 3	10 14	1 8.07	315	.860
12	Wed.	5 21	5 17	5 14	5 11	5 8	5 5	5 1	11 4	1 8.19	316	.862
13	Thur.	rises	rises	rises	rises	rises	rises	rises	11 53	1 8.31	317	.865
14	Frid.	5 7 a	5 13 a	5 19 a	5 26 a	5 32 a	5 38 a	5 44 a	morn	1 8.43	318	.868
15	Sat.	5 53	6 0	6 6	6 13	6 19	6 26	6 32	0 43	1 8.55	319	.871
16	*SUN.*	6 43	6 50	6 56	7 2	7 9	7 15	7 22	1 33	1 8.67	320	.873
17	Mon.	7 37	7 43	7 49	7 55	8 1	8 7	8 13	2 22	1 8.78	321	.876
18	Tues.	8 33	8 38	8 44	8 49	8 55	9 0	9 5	3 10	1 8.90	322	.879
19	Wed.	9 31	9 36	9 40	9 45	9 50	9 55	10 0	3 56	1 9.01	323	.882
20	Thur.	10 29	10 33	10 36	10 40	10 43	10 47	10 50	4 50	1 9.12	324	.884
21	Frid.	11 29	11 31	11 34	11 36	11 38	11 41	11 43	5 25	1 9.23	325	.887
22	Sat.	morn	morn	morn	morn	morn	morn	morn	6 8	1 9.34	326	.890
23	*SUN.*	0 30	0 31	0 32	0 33	0 34	0 36	0 37	6 52	1 9.44	327	.893
24	Mon.	1 32	1 32	1 32	1 32	1 32	1 32	1 32	7 36	1 9.55	328	.895
25	Tues.	2 36	2 35	2 34	2 33	2 31	2 30	2 39	8 23	1 9.65	329	.898
26	Wed.	3 44	3 41	3 39	3 36	3 34	3 31	3 28	9 13	1 9.75	330	.901
27	Tuur.	4 53	4 49	4 45	4 42	4 38	4 34	4 31	10 6	1 9.85	331	.903
28	Frid.	6 3	5 58	5 54	5 49	5 44	5 40	5 35	11 3	1 9.95	332	.906
29	Sat.	sets	sets	sets	sets	sets	sets	sets	0 3	1 10.04	333	.909
30	*SUN.*	5 54 a	6 0 a	6 7 a	6 14 a	6 20 a	6 27 a	6 33 a	1 5 a	1 10.13	334	.912

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d.	h.	m.		d.	h.	m.		d.	h.	
First Quarter .	6	1	7 a.	*Last Quarter* ..	21	11	18 a.	Perigee	3	4	m.
Full Moon.....	13	7	47 a.	New Moon.....	29	6	33 m.	Apogee	19	4	m.

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Augusta. Portland. Ends	Boston. Albany. Begins	Boston. Albany. Ends	New York. Philadelphia. Begins	New York. Philadelphia. Ends	Washington. Baltimore. Begins	Washington. Baltimore. Ends	Raleigh. Nashville. Begins	Raleigh. Nashville. Ends	Charleston. Savannah. Begins	Charleston. Savannah. Ends	New Orleans. Mobile. Begins	New Orleans. Mobile. Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	4 59	6 28	4 58	6 30	4 57	6 31	4 57	6 31	4 55	6 33	4 54	6 34	4 53	6 35
6	5 5	6 23	5 4	6 24	5 3	6 25	5 2	6 26	5 0	6 28	4 58	6 30	4 57	6 32
11	5 11	6 18	5 9	6 20	5 8	6 20	5 6	6 22	5 4	6 24	5 2	6 27	5 0	6 29
16	5 17	6 13	5 14	6 16	5 13	6 16	5 10	6 19	5 8	6 21	5 6	6 24	5 4	6 27
21	5 22	6 10	5 19	6 13	5 18	6 14	5 15	6 17	5 12	6 19	5 10	6 22	5 7	6 26
26	5 27	6 8	5 24	6 11	5 23	6 12	5 20	6 15	5 17	6 18	5 14	6 21	5 10	6 25
30	5 31	6 7	5 28	6 10	5 26	6 11	5 24	6 14	5 20	6 17	5 17	6 21	5 12	6 25

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Mean time of *Sun-rise* and *Sun-set*; for upper limb.

Days of the Month.	Days of the Week.	Augusta. Portland. SUN Rises.	Augusta. Portland. SUN Sets.	Boston. Albany. SUN Rises.	Boston. Albany. SUN Sets.	N. York. Philad'a. SUN Rises.	N. York. Philad'a. SUN Sets.	Wash'n. Baltim'e. SUN Rises.	Wash'n. Baltim'e. SUN Sets.	Raleigh. Nashville SUN Rises	Raleigh. Nashville SUN Sets.	Ch'ston. Savann'h SUN Rises.	Ch'ston. Savann'h SUN Sets.	N. Orl'ns. Mobile. SUN Rises.	N. Orl'ns. Mobile. SUN Sets.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	Mond.	7 16	4 23	7 10	4 28	7 5	4 34	7 0	4 39	6 52	4 46	6 44	4 54	6 39	5 0
2	Tues.	7 17	4 22	7 11	4 28	7 6	4 34	7 1	4 39	6 53	4 46	6 45	4 54	6 40	5 0
3	Wed.	7 18	4 22	7 12	4 28	7 7	4 34	7 2	4 39	6 54	4 46	6 46	4 54	6 40	5 0
4	Thur.	7 19	4 22	7 13	4 28	7 8	4 33	7 3	4 39	6 55	4 46	6 47	4 54	6 41	5 0
5	Frid.	7 20	4 22	7 14	4 28	7 9	4 33	7 4	4 38	6 56	4 46	6 47	4 54	6 42	5 0
6	Sat.	7 21	4 22	7 15	4 28	7 10	4 33	7 5	4 38	6 57	4 46	6 48	4 54	6 43	5 0
7	*SUN.*	7 22	4 22	7 16	4 28	7 11	4 33	7 6	4 38	6 58	4 46	6 49	4 54	6 44	5 0
8	Mond.	7 23	4 22	7 17	4 28	7 12	4 33	7 7	4 38	6 59	4 46	6 50	4 54	6 44	5 1
9	Tues.	7 24	4 21	7 18	4 28	7 13	4 33	7 8	4 38	6 59	4 46	6 50	4 54	6 45	5 1
10	Wed.	7 25	4 21	7 19	4 28	7 14	4 33	7 9	4 38	7 0	4 46	6 51	4 54	6 46	5 1
11	Thur.	7 26	4 21	7 20	4 28	7 15	4 33	7 10	4 38	7 1	4 46	6 52	4 55	6 46	5 1
12	Frid.	7 27	4 22	7 21	4 28	7 16	4 33	7 11	4 38	7 2	4 46	6 53	4 55	6 47	5 2
13	Sat.	7 28	4 22	7 22	4 28	7 16	4 33	7 11	4 38	7 3	4 46	6 54	4 55	6 48	5 2
14	*SUN.*	7 28	4 22	7 23	4 28	7 17	4 33	7 12	4 38	7 4	4 46	6 55	4 55	6 48	5 2
15	Mond.	7 29	4 22	7 24	4 29	7 18	4 34	7 13	4 39	7 5	4 47	6 56	4 56	6 49	5 3
16	Tues.	7 30	4 22	7 24	4 29	7 18	4 34	7 13	4 39	7 5	4 47	6 56	4 56	6 49	5 3
17	Wed.	7 30	4 23	7 25	4 29	7 19	4 34	7 14	4 40	7 6	4 48	6 57	4 56	6 50	5 3
18	Thur.	7 31	4 23	7 25	4 29	7 19	4 34	7 14	4 40	7 6	4 48	6 57	4 56	6 50	5 3
19	Frid.	7 32	4 23	7 26	4 30	7 20	4 35	7 15	4 41	7 7	4 49	6 58	4 57	6 51	5 4
20	Sat.	7 32	4 24	7 26	4 30	7 20	4 35	7 15	4 41	7 7	4 49	6 58	4 57	6 51	5 4
21	*SUN.*	7 33	4 24	7 27	4 31	7 21	4 36	7 15	4 42	7 8	4 50	6 59	4 58	6 52	5 5
22	Mond.	7 33	4 25	7 27	4 31	7 21	4 36	7 16	4 42	7 8	4 50	6 59	4 58	6 52	5 5
23	Tues.	7 33	4 25	7 28	4 32	7 22	4 37	7 16	4 43	7 9	4 51	7 0	4 59	6 53	5 6
24	Wed.	7 34	4 26	7 28	4 32	7 22	4 37	7 16	4 43	7 9	4 51	7 0	4 59	6 53	5 6
25	Thur.	7 34	4 27	7 28	4 33	7 22	4 38	7 17	4 44	7 9	4 52	7 0	5 0	6 53	5 7
26	Frid.	7 35	4 27	7 29	4 33	7 23	4 38	7 17	4 44	7 9	4 52	7 1	5 1	6 54	5 7
27	Sat.	7 35	4 28	7 29	4 34	7 23	4 39	7 17	4 45	7 9	4 53	7 1	5 1	6 54	5 8
28	*SUN.*	7 35	4 29	7 29	4 34	7 23	4 39	7 18	4 45	7 10	4 53	7 1	5 2	6 55	5 9
29	Mond.	7 35	4 29	7 29	4 35	7 23	4 40	7 18	4 46	7 10	4 54	7 2	5 3	6 55	5 9
30	Tues.	7 36	4 30	7 30	4 36	7 24	4 41	7 18	4 47	7 10	4 55	7 2	5 4	6 55	5 10
31	Wed.	7 36	4 31	7 30	4 37	7 24	4 42	7 19	4 48	7 11	4 56	7 3	5 5	6 56	5 11

Length and Decrease of Days.

Day of the Month.	Augusta. Portland. Length.	Augusta. Portland. Decr.	Boston. Albany. Length.	Boston. Albany. Decr.	New York. Philadelphia. Length.	New York. Philadelphia. Decr.	Washington. Baltimore. Length.	Washington. Baltimore. Decr.	Raleigh. Nashville. Length.	Raleigh. Nashville. Decr.	Charleston. Savannah. Length.	Charleston. Savannah. Decr.	New Orleans. Mobile. Length.	New Orleans. Mobile. Decr.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	9 7	6 26	9 18	5 59	9 29	5 31	9 39	5 14	9 54	4 48	10 10	4 19	10 21	4 44
3	9 4	6 28	9 16	6 1	9 27	5 33	9 37	5 16	9 52	4 50	10 8	4 21	10 20	4 45
5	9 1	6 31	9 14	6 3	9 24	5 36	9 34	5 19	9 50	4 52	10 7	4 22	10 18	4 47
7	8 59	6 33	9 12	6 5	9 22	5 38	9 32	5 22	9 48	4 54	10 5	4 24	10 17	4 48
9	8 57	6 35	9 10	6 7	9 20	5 40	9 30	5 23	9 47	4 55	10 4	4 25	10 16	4 49
11	8 55	6 37	9 8	6 9	9 18	5 42	9 28	5 25	9 45	4 57	10 2	4 27	10 15	4 50
13	8 53	6 38	9 6	6 11	9 17	5 43	9 27	5 26	9 43	4 59	10 1	4 28	10 14	4 51
15	8 53	6 39	9 5	6 12	9 16	5 44	9 26	5 27	9 42	5 0	10 0	4 29	10 13	4 52
17	8 52	6 40	9 4	6 13	9 15	5 45	9 26	5 27	9 42	5 0	9 59	4 30	10 13	4 52
19	8 51	6 41	9 4	6 13	9 15	5 45	9 26	5 27	9 42	5 0	9 59	4 30	10 13	4 52
21	8 51	Incr	9 4	Incr	9 15	Incr	9 26	Incr	9 42	Incr	9 59	Incr	10 13	Incr
23	8 51	0 0	9 4	0 0	9 15	0 0	9 26	0 0	9 42	0 0	9 59	0 0	10 13	0 0
25	8 52	0 1	9 5	0 1	9 16	0 1	9 27	0 0	9 42	0 0	9 59	0 0	10 13	0 0
27	8 53	0 2	9 5	0 1	9 16	0 1	9 27	0 1	9 43	0 1	10 0	0 1	10 14	0 1
29	8 53	0 4	9 6	0 2	9 17	0 2	9 28	0 2	9 44	0 2	10 1	0 2	10 14	0 1
31	8 54	0 5	9 7	0 3	9 18	0 3	9 29	0 3	9 45	0 3	10 2	0 3	10 15	0 2

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DECEMBER.

Days of the Month.	Days of the Week.	Mean time of Moon's Rising or Setting. Augusta. Portland. Sets.	Boston Albany. Sets.	N. York. Philada. Sets.	Was'ton. Bal'more. Sets.	Raleigh. Nash'ille. Sets.	Cha'ton. Savannah. Sets.	N. Orl'ns. Mobile. Sets.	Moon south Washington.	Sid-real Time of Sun's Semi-diam. passing the Meridian.	Day of the Year.	Fraction of the Year.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	m. s.		
1	Mon.	7 3a	7 9a	7 15a	7 21 a	7 27 a	7 33a	7 39 a	2 6a	1 10.22	335	.914
2	Tues.	8 16	8 21	8 26	8 31	8 37	8 42	8 47	3 6	1 10.31	336	.917
3	Wed.	9 20	9 33	9 37	9 40	9 44	9 48	9 52	4 2	1 10.3.	337	.920
4	Thur.	10 42	10 44	10 46	10 49	10 51	10 53	10 56	4 56	1 10.47	338	.923
5	Frid.	11 52	11 53	11 54	11 55	11 56	11 57	11 58	5 46	1 10.54	339	.925
6	Sat.	morn	morn	morn	morn	morn	morn	morn.	6 35	1 10.61	340	.928
7	*SUN.*	1 0	1 0	1 0	0 59	0 58	0 58	0 58	7 23	1 10.68	341	.931
8	Mon.	2 7	2 5	2 3	2 2	2 0	1 58	1 57	8 11	1 10.74	342	.934
9	Tues.	3 12	3 9	3 6	3 4	3 1	2 58	2 55	8 59	1 10.80	343	.936
10	Wed.	4 15	4 11	4 7	4 3	4 0	3 56	3 52	9 48	1 10.86	344	.939
11	Thur.	5 17	5 12	5 7	5 2	4 57	4 52	4 48	10 37	1 10.91	345	.942
12	Frid.	6 14	6 9	6 3	5 58	5 52	5 47	5 41	11 27	1 10.96	346	.945
13	Sat.	rises	rises	rises	rises	rises	rises	rises	morn	1 11.00	347	.947
14	*SUN.*	5 29a	5 35a	5 41a	5 48	5 54 a	6 0 a	6 6 a	0 17	1 11.04	348	.950
15	Mon.	6 24	6 30	6.36	6 41	6 47	6 52	6 58	1 15	1 11.08	349	.953
16	Tues.	7 21	7 26	7 31	7 36	7 41	7 45	7 50	1 51	1 11.11	350	.956
17	Wed.	8 20	8 23	8 27	8 31	8 35	8 39	8 43	2 37	1 11.14	351	.958
18	Thur.	9 18	9 21	9 24	9 27	9 29	9 32	9 35	3 21	1 11.16	352	.961
19	Frid.	10 18	10 19	10 21	10 23	10 24	10 26	10 28	4 4	1 11.18	353	.964
20	Sat.	11 18	11 18	11 19	11 19	11 20	11 20	11 21	4 47	1 11.19	354	.966
21	*SUN.*	morn	morn	morn	morn	morn	morn	morn	5 30	1 11.20	355	.969
22	Mon.	0 19	0 19	0 18	0 17	0 17	0 16	0 15	6 14	1 11.20	356	.972
23	Tues.	1 24	1 22	1 20	1 18	1 16	1 14	1 12	7 1	1 11.20	357	.975
24	Wed.	2 30	2 27	2 24	2 21	2 17	2 14	2 11	7 51	1 11.19	358	.977
25	Thur.	3 38	3 34	3 30	3 26	3 22	3 18	3 14	8 45	1 11.18	359	.980
26	Frid.	4 47	4 42	4 37	4 32	4 27	4 22	4 17	9 42	1 11.17	360	.983
27	Sat.	5 54	5 48	5 43	5 37	5 32	5 26	5 20	10 43	1 11.15	361	.986
28	*SUN.*	sets	sets	sets	sets	sets	sets	sets	11 46	1 11.12	362	.988
29	Mon.	5 51a	5 57a	6 2a	6 8a	6 14 a	6 19	6 25	0 48a	1 11.09	363	.991
30	Tues.	7 7	7 11	7 16	7 20	7 25	7 29	7 34	1 48	1 11.06	364	.994
31	Wed.	8 23	8 26	8 29	8 32	8 35	8 38	8 41	2 45	1 11.02	365	.997

MOON'S PHASES, APOGEE AND PERIGEE.

Washington Mean Time.

	d. h. m.		d. h. m.		d. h.
First Quarter ..	5 9 44 a.	*Last Quarter* ..	21 6 19 a	Perigee	1 1 a.
Full Moon	13 1 35 a.	New Moon	28 5 45 a.	Apogee	6 6 a.
				Perigee	29 10 m.

MEAN TIME OF BEGINNING AND END OF TWILIGHT.

Day of the Month.	Augusta. Portland. Begins	Augusta. Portland. Ends	Boston. Albany. Begins	Boston. Albany. Ends	New York Philadelphia. Begins	New York Philadelphia. Ends	Washington. Baltimore. Begins	Washington. Baltimore. Ends	Raleigh. Nashville. Begins	Raleigh. Nashville. Ends	Charleston. Savannah. Begins	Charleston. Savannah. Ends	New Orleans. Mobile. Begins	New Orleans. Mobile. Ends
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	5 32	6 7	5 28	6 9	5 27	6 11	5 25	6 13	5 21	6 17	5 17	6 21	5 13	6 25
6	5 37	6 6	5 34	6 9	5 32	6 11	5 29	6 14	5 25	6 18	5 21	6 22	5 17	6 26
11	5 41	6 7	5 38	6 8	5 36	6 11	5 33	6 14	5 28	6 19	5 24	6 24	5 21	6 27
16	5 44	6 8	5 41	6 9	5 39	6 12	5 36	6 15	5 31	6 21	5 27	6 27	5 24	6 28
21	5 47	6 10	5 44	6 12	5 42	6 14	5 39	6 17	5 35	6 23	5 30	6 29	5 27	6 29
26	5 49	6 13	5 46	6 15	5 44	6 17	5 41	6 20	5 37	6 25	5 32	6 31	5 29	6 32
31	5 52	6 15	5 48	6 19	5 45	6 21	5 43	6 24	5 39	6 29	5 34	6 33	5 31	6 36

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HIGH WATER AT BOSTON, MASS.

BOSTON MEAN TIME.

Day of the month.	January.		February.		March.		April.		May.		June.	
	Morn.	Eve	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	3 54	4 16	5 0	5 36	3 48	4 15	5 53	6 39	7 4	7 40	8 40	9 12
2	4 44	5 8	6 16	6 59	4 43	5 19	7 22	8 5	8 18	8 49	9 39	10 3
3	5 38	6 12	7 44	8 19	6 0	6 44	8 46	9 18	9 18	9 45	10 27	10 48
4	6 51	7 30	9 10	9 43	7 32	8 16	9 47	10 10	10 7	10 30	11 10	11 29
5	8 8	8 45	10 17	10 45	9 1	9 37	10 33	10 56	10 52	11 11	11 47	
6	9 21	9 54	11 10	11 35	10 4	10 32	11 17	11 34	11 30	11 50	0 6	0 22
7	10 23	10 52	11 57		10 57	11 19	11 54			0 8	0 42	0 57
8	11 18	11 43	0 20	0 41	11 41		0 12	0 31	0 24	0 43	1 15	1 31
9		0 9	1 1	1 20	0 1	0 19	0 48	1 4	0 58	1 14	1 47	2 5
10	0 33	0 56	1 41	1 59	0 37	0 56	1 21	1 38	1 32	1 49	2 23	2 42
11	1 18	1 41	2 18	2 36	1 14	1 31	1 54	2 10	2 6	2 25	3 0	3 20
12	2 3	2 23	2 52	3 11	1 48	2 6	2 28	2 46	2 41	3 1	3 41	4 4
13	2 44	3 6	3 30	3 47	2 22	2 38	3 6	3 25	3 23	3 46	4 28	4 55
14	3 24	3 46	4 9	4 29	2 57	3 15	3 46	4 10	4 9	4 35	5 23	5 57
15	4 8	4 29	4 55	5 24	3 33	3 56	4 37	5 10	5 3	5 38	6 31	7 2
16	4 52	5 17	6 0	6 42	4 16	4 41	5 46	6 29	6 15	6 48	7 33	8 5
17	5 48	6 26	7 25	8 8	5 13	5 50	7 6	7 44	7 21	7 52	8 38	9 8
18	7 2	7 39	8 48	9 24	6 35	7 17	8 18	8 50	8 24	8 53	9 39	10 6
19	8 19	8 55	9 54	10 18	7 59	8 37	9 18	9 40	9 18	9 44	10 34	10 59
20	9 32	9 58	10 39	10 58	9 12	9 40	10 3	10 25	10 8	10 34	11 27	11 53
21	10 22	10 45	11 18	11 36	10 5	10 25	10 45	11 4	10 55	11 19		0 19
22	11 6	11 23	11 53		10 46	11 4	11 23	11 44	11 45		0 45	1 9
23	11 43	11 59	0 10	0 26	11 22	11 37		0 5	0 6	0 30	1 32	1 57
24		0 17	0 43	0 59	11 56		0 25	0 46	0 54	1 17	2 22	2 46
25	0 34	0 49	1 15	1 32	0 13	0 30	1 7	1 29	1 43	2 7	3 11	3 35
26	1 6	1 22	1 51	2 9	0 51	1 8	1 51	2 15	2 32	2 59	4 1	4 25
27	1 38	1 54	2 25	2 45	1 26	1 46	2 40	3 4	3 24	3 53	4 52	5 20
28	2 13	2 30	3 4	3 25	2 6	2 26	3 31	4 1	4 21	4 53	5 49	6 25
29	2 48	3 8			2 49	3 11	4 33	5 7	5 23	5 55	6 55	7 26
30	3 26	3 48			3 39	4 6	5 45	6 26	6 34	7 3	8 0	8 35
31	4 11	4 36			4 36	5 11			7 37	8 9		

Day of the month.	July.		August.		September.		October.		November.		December.	
	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.
	h. m.	h m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	9 8	9 37	10 29	10 49	11 19	11 35	11 20	11 36		0 4	0 9	0 32
2	10 2	10 25	11 10	11 28	11 53		11 55		0 25	0 45	0 54	1 17
3	10 47	11 9	11 45		0 8	0 24	0 10	0 29	1 7	1 27	1 42	2 6
4	11 29	11 46	0 4	0 19	0 40	0 56	0 47	1 4	1 50	2 13	2 30	2 56
5		0 6	0 35	0 52	1 12	1 29	1 23	1 42	2 38	3 3	3 24	3 50
6	0 24	0 41	1 6	1 22	1 48	2 3	2 2	2 23	3 28	3 59	4 16	4 47
7	0 56	1 14	1 37	1 55	2 22	2 42	2 44	3 10	4 31	5 8	5 19	5 55
8	1 29	1 46	2 12	2 28	3 1	3 23	3 38	4 7	5 47	6 28	6 30	7 4
9	2 2	2 19	2 46	3 6	3 49	4 15	4 40	5 16	7 4	7 43	7 38	8 14
10	2 38	2 55	3 26	3 47	4 46	5 24	6 2	6 46	8 20	8 51	8 48	9 18
11	3 16	3 36	4 12	4 39	6 9	6 54	7 30	8 9	9 19	9 45	9 44	10 8
12	3 58	4 21	5 7	5 43	7 39	8 22	8 45	9 15	10 6	10 30	10 30	10 53
13	4 45	5 12	6 24	7 5	9 0	9 31	9 41	10 4	10 51	11 11	11 13	11 33
14	5 42	6 18	7 47	8 31	9 59	10 34	10 29	10 50	11 32	11 51	11 54	
15	6 54	7 29	9 9	9 40	10 50	11 13	11 10	11 30		0 8	0 12	0 29
16	8 6	8 44	10 13	10 40	11 32	11 54	11 49		0 28	0 44	0 45	1 4
17	9 17	9 51	11 6	11 28		0 13	0 9	0 29	1 2	1 18	1 20	1 37
18	10 20	10 50	11 54		0 33	0 53	0 47	1 5	1 35	1 52	1 54	2 11
19	11 15	11 42	0 15	0 37	1 11	1 30	1 22	1 38	2 10	2 29	2 28	2 48
20		0 8	0 59	1 18	1 48	2 5	1 57	2 15	2 48	3 9	3 6	3 24
21	0 32	0 56	1 39	1 58	2 24	2 43	2 33	2 53	3 30	3 53	3 44	4 5
22	1 18	1 39	2 18	2 37	3 2	3 22	3 13	3 35	4 17	4 45	4 28	4 54
23	2 3	2 24	2 57	3 16	3 44	4 7	4 0	4 24	5 16	5 52	5 22	5 56
24	2 46	3 8	3 36	3 58	4 34	5 7	4 59	5 37	6 28	7 2	6 31	7 6
25	3 29	3 52	4 20	4 46	5 47	6 28	6 16	6 55	7 33	8 4	7 40	8 15
26	4 15	4 39	5 16	5 53	7 10	7 49	7 31	8 6	8 37	9 2	8 49	9 20
27	5 3	5 31	6 33	7 14	8 26	9 0	8 37	9 7	9 30	9 52	9 48	10 13
28	6 7	6 41	7 54	8 32	9 28	9 49	9 28	9 50	10 17	10 41	10 40	11 6
29	7 17	7 53	9 8	9 38	10 10	10 27	10 10	10 30	11 2	11 23	11 30	11 55
30	8 33	9 7	10 0	10 23	10 47	11 0	10 48	11 6	11 46			0 22
31	9 40	10 6	10 43	11 2			11 26	11 46			0 46	1 9

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HIGH WATER AT NEW YORK, N. Y.

NEW YORK MEAN TIME.

Day of the month.	January.		February.		March.		April.		May.		June.	
	Morn.	Eve	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	1 35	1 57	2 41	3 17	1 29	1 56	3 34	4 20	4 45	5 21	6 21	6 53
2	2 25	2 49	3 57	4 40	2 24	3 0	5 3	5 46	5 59	6 30	7 20	7 44
3	3 19	3 53	5 25	6 10	3 41	4 25	6 27	6 59	6 59	7 26	8 8	8 29
4	4 32	5 11	6 51	7 24	5 13	5 57	7 28	7 51	7 46	8 11	8 51	9 10
5	5 49	6 26	7 58	8 26	6 42	7 18	8 14	8 37	8 33	8 52	9 28	9 47
6	7 2	7 35	8 54	9 16	7 45	8 13	8 58	9 15	9 11	9 31	10 3	10 23
7	8 4	8 33	9 38	9 48	8 38	9 0	9 35	9 53	9 49	10 5	10 38	10 56
8	8 59	9 23	10 22	10 42	9 22	9 42	10 11	10 29	10 24	10 39	11 12	11 28
9	9 50	10 14	11 1	11 22	10 0	10 18	10 45	11 2	10 55	11 13	11 46	
10	10 37	10 59	11 40	11 59	10 37	10 55	11 19	11 35	11 30	11 47	0 4	0 23
11	11 22	11 44		0 17	11 12	11 29	11 51			0 6	0 41	1 1
12		0 4	0 33	0 52	11 47		0 9	0 27	0 22	0 42	1 22	1 45
13	0 25	0 47	1 11	1 28	0 3	0 19	0 47	1 6	1 4	1 27	2 9	2 36
14	1 5	1 27	1 50	2 10	0 38	0 56	1 27	1 51	1 50	2 16	3 4	3 38
15	1 49	2 10	2 36	3 5	1 14	1 37	2 18	2 51	2 44	3 19	4 12	4 43
16	2 33	2 58	3 41	4 23	1 57	2 22	3 27	4 10	3 56	4 29	5 14	5 46
17	3 29	4 7	5 6	5 49	2 54	3 31	4 47	5 25	5 2	5 33	6 19	6 49
18	4 43	5 20	6 29	7 5	4 16	4 58	5 59	6 31	6 5	6 34	7 20	7 47
19	6 0	6 36	7 35	7 59	5 40	6 18	6 50	7 21	6 59	7 25	8 15	8 40
20	7 13	7 39	8 20	8 39	6 53	7 21	7 44	8 6	7 49	8 15	9 8	9 34
21	8 3	8 26	8 59	9 17	7 46	8 6	8 26	8 45	8 36	9 0	10 0	10 26
22	8 47	9 4	9 34	9 51	8 27	8 45	9 4	9 25	9 25	9 47	10 50	11 13
23	9 24	9 40	10 7	10 24	9 3	9 18	9 46	10 6	10 11	10 35	11 38	
24	9 58	10 15	10 40	10 56	9 37	9 54	10 27	10 48	10 58	11 24	0 3	0 27
25	10 30	10 47	11 13	11 32	10 11	10 32	11 10	11 32	11 48		0 52	1 16
26	11 3	11 19	11 50		10 49	11 7	11 56		0 13	0 40	1 42	2 6
27	11 35	11 54	0 6	0 26	11 27	11 47	0 21	0 45	1 5	1 34	2 33	3 1
28		0 11	0 45	1 6		0 7	1 12	1 42	2 2	2 34	3 30	4 6
29	0 29	0 49			0 30	0 52	2 14	2 48	3 4	3 36	4 36	5 7
30	1 7	1 29			1 20	1 47	3 26	4 7	4 15	4 44	5 41	6 16
31	1 52	2 17			2 17	2 52			5 18	5 50		

Day of the month.	July.		August.		September.		October.		November.		December.	
	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.
	h. m.	h m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	6 49	7 18	8 10	8 30	9 0	9 16	9 1	9 17	9 45	10 6	10 13	10 35
2	7 43	8 6	8 51	9 9	9 34	9 49	9 36	9 51	10 26	10 48	10 58	11 23
3	8 28	8 50	9 26	9 45	10 5	10 21	10 10	10 28	11 8	11 31	11 47	
4	9 10	9 27	10 0	10 16	10 37	10 53	10 45	11 4	11 54		0 11	0 37
5	9 47	10 5	10 33	10 47	11 10	11 29	11 23	11 43	0 19	0 44	1 5	1 31
6	10 22	10 37	11 3	11 18	11 44			0 3	1 9	1 40	1 57	2 28
7	10 55	11 10	11 36	11 53	0 3	0 23	0 25	0 51	2 12	2 49	3 0	3 36
8	11 27	11 43		0 9	0 42	1 4	1 19	1 48	3 28	4 9	4 11	4 45
9		0 0	0 27	0 47	1 30	1 56	2 20	2 57	4 45	5 24	5 19	5 55
10	0 19	0 36	1 7	1 38	2 27	3 5	3 43	4 27	6 1	6 32	6 29	6 59
11	0 57	1 17	1 53	2 20	3 50	4 35	5 11	5 50	7 0	7 26	7 25	7 49
12	1 39	2 2	2 48	3 24	4 20	6 3	6 26	6 56	7 47	8 11	8 11	8 34
13	2 26	2 53	4 5	4 46	6 41	7 12	7 22	7 45	8 32	8 52	8 54	9 14
14	3 23	3 59	5 28	6 12	7 40	8 15	8 10	8 31	9 13	9 32	9 35	9 53
15	4 35	5 10	6 50	7 21	8 31	8 54	8 51	9 11	9 49	10 9	10 10	10 26
16	5 47	6 25	7 54	8 21	9 13	9 35	9 30	9 50	10 25	10 43	10 45	11 1
17	6 58	7 32	8 47	9 9	9 54	10 14	10 10	10 28	10 59	11 16	11 18	11 35
18	8 1	8 31	9 35	9 56	10 34	10 52	10 46	11 3	11 33	11 51	11 52	
19	8 56	9 23	10 18	10 40	11 11	11 29	11 19	11 38		0 10	0 9	0 29
20	9 49	10 13	10 59	11 20	11 46		11 56		0 29	0 50	0 47	1 5
21	10 37	10 59	11 30	11 59	0 5	0 24	0 14	0 34	1 11	1 34	1 25	1 46
22	11 20	11 44		0 18	0 43	1 3	0 54	1 16	1 58	2 26	2 9	2 35
23		0 5	0 38	0 57	1 25	1 48	1 41	2 5	2 57	3 33	3 3	3 37
24	0 27	0 49	1 17	1 39	2 15	2 48	2 40	3 18	4 9	4 43	4 12	4 47
25	1 10	1 33	2 1	2 27	3 28	4 9	3 57	4 36	5 14	5 45	5 21	5 56
26	1 56	2 20	2 57	3 34	4 51	5 30	5 12	5 47	6 18	6 43	6 30	7 1
27	2 44	3 11	4 14	4 55	6 7	6 41	6 18	6 48	7 11	7 33	7 29	7 54
28	3 48	4 22	5 35	6 13	7 9	7 30	7 9	7 31	7 58	8 22	8 21	8 47
29	4 58	5 34	6 49	7 19	7 51	8 8	7 51	8 11	8 43	9 4	9 11	9 36
30	6 14	6 48	7 41	8 4	8 28	8 41	8 29	8 47	9 27	9 50	10 3	10 27
31	7 21	7 47	8 24	8 43			9 7	9 37			10 50	11 13

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HIGH WATER AT PHILADELPHIA, PA.

PHILADELPHIA MEAN TIME.

Day of the month	January.		February.		March.		April.		May.		June.	
	Morn.	Eve	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	6 54	7 16	8 0	8 36	6 48	7 15	8 53	9 30	10 4	10 40	11 40	
2	7 44	8 8	9 16	9 59	7 43	8 19	10 22	11 5	11 18	11 49	0 12	0 39
3	8 38	9 12	10 44	11 19	9 0	9 44	11 46			0 18	1 3	1 27
4	9 51	10 30		0 10	10 32	11 16	0 18	0 47	0 45	1 7	1 48	2 10
5	11 8	11 45	0 43	1 17		0 1	1 10	1 33	1 30	1 52	2 29	2 47
6		0 21	1 45	2 10	0 37	1 4	1 56	2 17	2 11	2 30	3 6	3 22
7	0 54	1 23	2 35	2 57	1 32	1 57	2 34	2 54	2 50	3 8	3 42	3 57
8	1 52	2 18	3 20	3 41	2 19	2 41	3 12	3 31	3 24	3 43	4 15	4 31
9	2 42	3 9	4 1	4 20	3 1	3 19	3 48	4 4	3 58	4 14	4 47	5 5
10	3 33	3 56	4 41	4 59	3 37	3 56	4 21	4 38	4 32	4 49	5 23	5 42
11	4 18	4 41	5 18	5 36	4 14	4 31	4 54	5 10	5 6	5 25	6 0	6 20
12	5 3	5 23	5 52	6 11	4 48	5 6	5 28	5 46	5 41	6 1	6 41	7 4
13	5 44	6 6	6 30	6 47	5 22	5 38	6 6	6 25	6 23	6 46	7 28	7 55
14	6 24	6 46	7 9	7 29	5 57	6 15	6 46	7 10	7 9	7 35	8 23	8 57
15	7 8	7 29	7 55	8 24	6 33	6 56	7 37	8 10	8 3	8 38	9 31	10 2
16	7 52	8 17	9 0	9 42	7 16	7 41	8 46	9 29	9 15	9 48	10 33	11 5
17	8 48	9 26	10 25	11 8	8 13	8 50	10 6	10 44	10 21	10 52	11 38	
18	10 2	10 39	11 48		9 35	10 17	11 18	11 50	11 24	11 53	0 8	0 39
19	11 19	11 55	0 24	0 54	10 59	11 37		0 18		0 18	1 6	1 34
20		0 32	1 18	1 39		0 12	0 40	1 3	0 44	1 8	1 59	2 27
21	0 58	1 22	1 58	2 18	0 40	1 5	1 25	1 45	1 34	1 55	2 53	3 19
22	1 45	2 6	2 36	2 53	1 25	1 46	2 4	2 23	2 19	2 45	3 45	4 9
23	2 23	2 43	3 10	3 26	2 4	2 22	2 44	3 5	3 6	3 30	4 32	4 57
24	2 59	3 17	3 43	3 59	2 37	2 56	3 25	3 46	3 54	4 17	5 22	5 46
25	3 34	3 49	4 15	4 32	3 13	3 30	4 7	4 29	4 43	5 7	6 11	6 35
26	4 6	4 22	4 51	5 9	3 51	4 8	4 51	5 15	5 32	5 59	7 1	7 25
27	4 38	4 54	5 25	5 45	4 26	4 46	5 40	6 4	6 23	6 53	7 52	8 20
28	5 13	5 30	6 4	6 25	5 6	5 26	6 31	7 1	7 21	7 53	8 49	9 25
29	5 48	6 8			5 49	6 11	7 33	8 7	8 23	8 55	9 55	10 26
30	6 26	6 48			6 39	7 6	8 45	9 26	9 34	10 3	11 0	11 35
31	7 11	7 36			7 36	8 11			10 37	11 9		

Day of the month.	July.		August.		September.		October.		November.		December.	
	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m	h. m.	h. m.
1		0 8	1 6	1 29	2 2	2 19	2 0	2 20	2 46	3 4	3 9	3 32
2	0 37	1 2	1 49	2 10	2 35	2 53	2 36	2 55	3 25	3 45	3 54	4 17
3	1 25	1 47	2 28	2 45	3 8	3 24	3 10	3 29	4 7	4 27	4 42	5 6
4	2 9	2 29	3 4	3 19	3 40	3 56	3 47	4 4	4 50	5 13	5 30	5 56
5	2 46	3 6	3 35	3 52	4 12	4 29	4 23	4 42	5 38	6 3	6 24	6 50
6	3 24	3 41	4 6	4 22	4 48	5 3	5 2	5 23	6 28	6 59	7 16	7 47
7	3 56	4 14	4 37	4 55	5 22	5 42	5 44	6 10	7 31	8 8	8 19	8 55
8	4 29	4 46	5 12	5 28	6 1	6 23	6 38	7 7	8 47	9 28	9 30	10 4
9	5 2	5 19	5 46	6 6	6 49	7 15	7 40	8 16	10 4	10 43	10 38	11 14
10	5 38	5 55	6 26	6 47	7 46	8 24	9 2	9 46	11 20	11 51	11 48	
11	6 16	6 36	7 12	7 39	9 9	9 54	10 30	11 9		0 19	0 18	0 44
12	6 58	7 21	8 7	8 43	10 39	11 22	11 45		0 45	1 6	1 8	1 30
13	7 45	8 12	9 24	10 5		0 0	0 15	0 41	1 30	1 51	1 53	2 13
14	8 42	9 18	10 47	11 31	0 31	0 59	1 4	1 29	2 11	2 32	2 33	2 54
15	9 54	10 29		0 9	1 34	1 50	1 50	2 10	2 51	3 8	3 12	3 29
16	11 6	11 44	0 40	1 13	2 13	2 32	2 30	2 49	3 28	3 44	3 45	4 4
17		0 17	1 40	2 6	2 54	3 13	3 9	3 29	4 2	4 18	4 20	4 37
18	0 51	1 20	2 28	2 54	3 33	3 53	3 47	4 5	4 35	4 52	4 54	5 11
19	1 50	2 15	3 15	3 37	4 11	4 30	4 22	4 38	5 10	5 29	5 28	5 48
20	2 42	3 8	3 59	4 18	4 48	5 5	4 57	5 15	5 48	6 9	6 6	6 24
21	3 32	3 56	4 39	4 58	5 24	5 43	5 33	5 53	6 30	6 53	6 44	7 5
22	4 18	4 39	5 18	5 37	6 2	6 22	6 13	6 35	7 17	7 45	7 28	7 54
23	5 3	5 24	5 57	6 16	6 44	7 7	7 0	7 24	8 16	8 52	8 22	8 56
24	5 46	6 8	6 36	6 58	7 34	8 7	7 59	8 37	9 28	10 2	9 31	10 6
25	6 29	6 52	7 20	7 46	8 47	9 28	9 16	9 55	10 33	11 4	10 40	11 15
26	7 15	7 39	8 16	8 53	10 10	10 49	10 31	11 6	11 37		11 49	
27	8 3	8 31	9 33	10 14	11 26		11 37		0 2	0 30	0 20	0 48
28	9 7	9 41	10 54	11 32	0 0	0 28	0 7	0 28	0 52	1 17	1 13	1 40
29	10 17	10 53		0 8	0 49	1 10	0 50	1 10	1 41	2 2	2 6	2 30
30	11 33		0 38	1 0	1 27	1 47	1 30	1 48	2 23	2 46	2 55	3 22
31	0 7	0 40	1 23	1 43			2 6	2 26			3 46	4 9

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HIGH WATER AT CHARLESTON, S. C.

CHARLESTON MEAN TIME.

Day of the month.	January.		February.		March.		April.		May.		June.	
	Morn.	Eve	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1		0 16	1 0	1 36		0 15	1 53	2 39	3 4	3 40	4 40	5 12
2	0 44	1 8	2 16	2 59	0 43	1 19	3 22	4 5	4 18	4 49	5 39	6 3
3	1 38	2 12	3 44	4 19	2 0	2 44	4 46	5 18	5 18	5 45	6 27	6 48
4	2 51	3 30	5 10	5 43	3 32	4 16	5 47	6 10	6 7	6 30	7 10	7 29
5	4 8	4 45	6 17	6 45	5 1	5 37	6 33	6 56	6 52	7 11	7 47	8 6
6	5 21	5 54	7 10	7 35	6 4	6 32	7 17	7 34	7 30	7 50	8 22	8 42
7	6 23	6 52	7 57	8 7	6 57	7 19	7 54	8 12	8 8	8 24	8 57	9 15
8	7 18	7 42	8 41	9 1	7 41	8 1	8 31	8 48	8 43	8 58	9 31	9 47
9	8 9	8 33	9 20	9 41	8 19	8 37	9 4	9 21	9 14	9 32	10 5	10 23
10	8 56	9 18	9 59	10 18	8 56	9 14	9 38	9 54	9 49	10 6	10 42	11 0
11	9 41	10 3	10 36	10 52	9 31	9 48	10 10	10 28	10 25	10 41	11 20	11 41
12	10 23	10 44	11 11	11 30	10 6	10 22	10 46	11 6	11 1	11 23		0 4
13	11 6	11 24	11 47		10 38	10 57	11 25	11 46	11 46		0 28	0 55
14	11 46		0 9	0 29	11 15	11 33		0 10	0 9	0 35	1 23	1 57
15	0 8	0 29	0 55	1 24	11 56		0 37	1 10	1 3	1 38	2 31	3 2
16	0 52	1 17	2 0	2 42	0 16	0 41	1 46	2 29	2 15	2 48	3 33	4 5
17	1 48	2 26	3 25	4 8	1 13	1 50	3 6	3 44	3 21	3 52	4 38	5 8
18	3 2	3 39	4 48	5 24	2 35	3 17	4 18	4 50	4 24	4 53	5 39	6 6
19	4 19	4 55	5 54	6 18	3 59	4 37	5 18	5 40	5 18	5 44	6 34	6 59
20	5 32	5 58	6 39	6 58	5 12	5 40	6 3	6 25	6 8	6 34	7 27	7 53
21	6 22	6 45	7 18	7 36	6 5	6 25	6 45	7 4	6 55	7 19	8 19	8 45
22	7 6	7 23	7 53	8 10	6 46	7 4	7 23	7 44	7 44	8 6	9 9	9 32
23	7 43	7 59	8 26	8 43	7 22	7 37	8 5	8 25	8 30	8 54	9 57	10 22
24	8 17	8 34	8 59	9 15	7 56	8 13	8 46	9 7	9 17	9 43	10 46	11 11
25	8 49	9 6	9 32	9 51	8 30	8 51	9 29	9 51	10 7	10 32	11 35	
26	9 22	9 38	10 9	10 25	9 8	9 29	10 15	10 40	10 59	11 24	0 1	0 25
27	9 54	10 13	10 45	11 4	9 46	10 6	11 4	11 31	11 53		0 52	1 20
28	10 30	10 48	11 25	11 48	10 26	10 49		0 1	0 21	0 53	1 49	2 25
29	11 8	11 26			11 11	11 39	0 33	1 7	1 23	1 55	2 55	3 26
30	11 48					0 6	1 45	2 26	2 34	3 3	4 0	4 35
31	0 11	0 36			0 36	1 11			3 37	4 9		

Day of the month.	July.		August.		September.		October.		November.		December.	
	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.	Morn.	Eve.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	5 8	5 37	6 29	6 49	7 19	7 35	7 20	7 36	8 4	8 25	8 32	8 54
2	6 2	6 25	7 10	7 28	7 53	8 8	7 55	8 10	8 45	9 7	9 17	9 42
3	6 47	7 9	7 45	8 4	8 24	8 40	8 29	8 47	9 27	9 50	10 6	10 30
4	7 29	7 46	8 19	8 35	8 56	9 12	9 4	9 23	10 13	10 38	10 56	11 24
5	8 6	8 24	8 52	9 6	9 29	9 48	9 42	10 2	11 3	11 28	11 50	
6	8 41	8 56	9 22	9 37	10 3	10 22	10 23	10 44	11 59		0 16	0 47
7	9 14	9 29	9 55	10 12	10 42	11 1	11 10	11 38	0 31	1 8	1 19	1 55
8	9 46	10 2	10 28	10 46	11 23	11 49		0 7	1 47	2 28	2 30	3 4
9	10 19	10 38	11 6	11 26		0 15	0 40	1 16	3 4	3 43	3 38	4 14
10	10 55	11 16	11 47		0 46	1 24	2 2	2 46	4 20	4 51	4 48	5 18
11	11 36	11 58	0 12	0 39	2 9	2 54	3 30	4 9	5 19	5 45	5 44	6 8
12		0 21	1 7	1 43	3 39	4 22	4 45	5 15	6 6	6 30	6 30	6 53
13	0 45	1 12	2 24	3 5	5 0	5 31	5 41	6 4	6 51	7 11	7 13	7 33
14	1 42	2 18	3 47	4 31	5 59	6 34	6 29	6 50	7 32	7 51	7 54	8 12
15	2 54	3 29	5 9	5 40	6 50	7 13	7 10	7 30	8 8	8 28	8 29	8 45
16	4 6	4 44	6 13	6 40	7 32	7 54	7 49	8 9	8 44	9 2	9 4	9 20
17	5 17	5 51	7 6	7 28	8 13	8 33	8 29	8 47	9 18	9 35	9 37	9 54
18	6 20	6 50	7 54	8 15	8 53	9 11	9 5	9 22	9 52	10 10	10 11	10 28
19	7 15	7 42	8 37	8 59	9 30	9 48	9 38	9 57	10 29	10 48	10 48	11 6
20	8 8	8 32	9 18	9 39	10 5	10 24	10 15	10 33	11 9	11 30	11 24	11 44
21	8 56	9 18	9 58	10 18	10 43	11 2	10 53	11 13	11 53			0 5
22	9 39	10 3	10 37	10 57	11 22	11 44	11 35		0 17	0 45	0 28	0 54
23	10 24	10 46	11 16	11 36		0 7	0 0	0 24	1 16	1 52	1 22	1 56
24	11 8	11 29	11 58		0 34	1 7	0 59	1 37	2 28	3 2	2 31	3 6
25	11 52		0 20	0 46	1 47	2 28	2 16	2 55	3 33	4 4	3 40	4 15
26	0 15	0 39	1 16	1 53	3 10	3 49	3 31	4 6	4 37	5 2	4 49	5 20
27	1 3	1 31	2 33	3 14	4 26	5 0	4 37	5 7	5 30	5 52	5 48	6 13
28	2 7	2 41	3 54	4 32	5 28	5 49	5 28	5 50	6 17	6 41	6 40	7 6
29	3 17	3 53	5 8	5 38	6 10	6 27	6 10	6 38	7 2	7 23	7 30	7 53
30	4 33	5 7	6 0	6 23	6 47	7 0	6 48	7 6	7 46	8 9	8 22	8 46
31	5 40	6 6	6 43	7 2			7 26	7 46			9 9	9 32

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1845. JANUARY.

At Greenwich Apparent Noon.

Day of the Month.	Day of the Week.	SUN'S Right Ascension.	Diff. for 1 hour.	S. Declination.	Diff. for 1 hour.	Log. δ.1	Dif. for 1 hr.	Sun's Semi-diameter.	Equa. of Time Add.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			° ′	m. s.	s.	
1	Wed.	18 47 56.44	11.034	23 0 2.5	13.23	+2.78333	157	16 17.3	3 56.93	1.175	9.9926525
2	Thur.	18 52 21.26	11.020	22 54 45.1	14.37	2.82099	143	17.3	4 25.12	.160	.9926580
3	Frid.	18 56 45.74	11.004	22 49 0.3	15.50	2.85540	132	17.3	4 52.97	.144	.9926656
4	Sat.	19 1 9.84	10.987	22 42 48.3	16.63	2.88711	124	17.3	5 20.43	.127	.9926751
5	*Sun.*	19 5 33.53	969	22 36 9.2	17.75	2.91651	114	17.2	5 47.49	.109	.9926865
6	Mon.	19 9 56.78	949	22 29 3.2	18.86	2.94379	106	17.2	6 14.11	.089	.9926996
7	Tues.	19 14 19.55	928	22 21 30.6	19.96	2.96923	99	17.2	6 40.25	.069	.9927145
8	Wed.	19 18 41.83	906	22 13 31.6	21.05	2.99308	93	17.1	7 5.90	.047	.9927311
9	Thur.	19 23 3.57	883	22 5 6.4	22.13	3.01544	88	17.1	7 31.02	1.023	.9927492
10	Frid.	19 27 24.75	858	21 56 15.4	23.20	3.03651	83	17.1	7 55.57	0.999	.9927690
11	Sat.	19 31 45.34	832	21 46 58.7	24.25	3.05641	78	17.0	8 19.54	.973	.9927905
12	*Sun.*	19 36 5.30	805	21 37 16.7	25.30	3.07522	74	16.9	8 42.88	.946	.9928137
13	Mon.	19 40 24.63	778	21 27 9.6	26.33	3.09304	70	16.9	9 5.59	.919	.9928388
14	Tues.	19 44 43 29	749	21 16 37.8	27.35	3.10995	67	16.8	9 27.64	.890	.9928657
15	Wed.	19 49 1.26	720	21 5 41.5	28.35	3.12603	64	16.8	9 48.99	.861	.9928947
16	Thur.	19 53 18.54	690	20 54 21.1	29.34	3.14132	61	16.7	10 9.65	.831	.9929258
17	Frid.	19 57 35.09	659	20 42 36.9	30.32	3.15591	58	16.6	10 29.59	.800	.9929591
18	Sat.	20 1 50.90	628	20 30 29.2	31.28	3.16982	55	16.5	10 48.79	.769	.9929949
19	*Sun.*	20 6 5.96	596	20 17 58.4	32.24	3.18313	53	16.4	11 7.25	.737	.9930331
20	Mon.	20 10 20.26	564	20 5 4.7	33.18	3.19587	51	16.4	11 24.94	.705	.9930738
21	Tues.	20 14 33.79	531	19 51 48.5	34.10	3.20804	48	16 3	11 41.87	.673	.9931172
22	Wed.	20 18 46.53	499	19 38 10.2	35.01	3.21972	47	16.2	11 58.01	.640	.9931633
23	Thur.	20 22 58.50	465	19 24 10.0	35.90	3.23091	46	16 0	12 13.38	.608	.9932122
24	Frid.	20 27 9.67	432	19 9 48.4	36.78	3.24162	43	15.9	12 27.96	.575	.9932637
25	Sat.	20 31 20.05	399	18 55 5.7	37.64	3.25191	41	15.8	12 41.75	.541	.9933178
26	*Sun.*	20 35 29.63	366	18 40 2.3	38.49	3.26179	40	15.7	12 54.74	.508	.9933744
27	Mon.	20 39 38.42	332	18 24 38.5	39.33	3.27128	38	15.5	13 6.93	.475	.9934335
28	Tues.	20 43 46.39	299	18 8 54.7	40.15	3.28042	36	15.4	13 18.32	.441	.9934951
29	Wed.	20 47 53.57	265	17 52 51.2	40.94	3.28917	35	15.3	13 28.91	.408	.9935589
30	Thur.	20 51 59.94	232	17 36 28.6	41.73	3.29756	34	15.1	13 38.70	.374	.9936247
31	Frid.	20 56 5.50	10.198	17 19 47.1	42.49	+3.30563	32	16 15.0	13.47.68	0.341	9.9936925

FEBRUARY.

At Greenwich Apparent Noon.

Day of the Month.	Day of the Week.	SUN'S Right Ascension.	Diff. for 1 hour.	S. Declination.	Diff. for 1 hour.	Log. δ.1	Dif. for 1 hr.	Sun's Semi-diameter.	Equa. of Time Add.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			° ′	m. s.	s.	
1	Sat.	21 0 10.26	10.165	17 2 47.3	43.25	+3.31338	31	16 14.8	13 55.87	0.307	9.9937622
2	*Sun.*	21 4 14.21	131	16 45 29.4	43.98	3.32083	30	14.6	14 3.24	.273	.9938334
3	Mon.	21 8 17.35	097	16 27 54.0	44.69	3.32797	29	14.5	14 9.80	.240	.9939062
4	Tues.	21 12 19.67	063	16 10 1.4	45.39	3.33484	27	14.3	14 15.56	.206	.9939804
5	Wed.	21 16 21 19	10.030	15 51 52.1	46.06	3.34139	26	14.2	14 20.51	.173	.9940559
6	Thur.	21 20 21.90	9.996	15 33 26.6	46.72	3.34770	25	14.0	14 24.65	.139	.9941326
7	Frid.	21 24 21.80	963	15 14 45.2	47.37	3.35378	24	13.8	14 27.99	.106	.9942104
8	Sat.	21 28 20.90	929	14 55 48.3	48.00	3.35961	23	13.6	14 30.53	.073	.9942894
9	*Sun.*	21 32 19.20	896	14 36 36.4	48.60	3.36517	22	13.5	14 32.27	.040	.9943696
10	Mon.	21 36 16.71	863	14 17 10.0	49.19	3.37049	21	13.3	14 33.22	.006	.9944509
11	Tues.	21 40 13.41	830	13 57 29.5	49.75	3.37559	20	13.1	14 33.37	.027	.9945334
12	Wed.	21 44 9.33	797	13 37 35.4	50.31	3.38050	20	12.9	14 32.73	.059	.9946172
13	Thur.	21 48 4.47	765	13 17 27.9	50.84	3.38520	19	12.7	14 31.32	.091	.9947023
14	Frid.	21 51 58.83	734	12 57 7.7	51.36	3.38968	18	12.5	14 29.14	.122	.9947890
15	Sat.	21 55 52.45	703	12 36 35.0	51.86	3.39400	17	12.3	14 26 21	.153	.9948773
16	*Sun.*	21 59 45.32	672	12 15 50.3	52.35	3.39811	16	12.1	14 22.53	.184	.9949672
17	Mon.	22 3 37.45	643	11 54 54.0	52.82	3.40207	16	11.9	14 18.12	.213	.9950588
18	Tues.	22 7 28.88	613	11 33 46.4	53.26	3.40584	15	11.7	14 13.01	.243	.9951523
19	Wed.	22 11 19.59	585	11 12 28.1	53.70	3.40944	14	11.5	14 7.18	.271	.9952476
20	Thur.	22 15 9.62	558	10 50 59.3	54.12	3.41290	13	11.3	14 0.68	.298	.9953449
21	Frid.	22 18 59.00	530	10 29 20.5	54 52	3.41619	13	11.0	13 53.52	.325	.9954441
22	Sat.	22 22 47.72	504	10 7 32 0	54.90	3.41933	12	10.8	13 45.72	.352	.9955454
23	*Sun.*	22 26 35.82	479	9 45 34.3	55.27	3.42231	12	10.6	13 37.28	.376	.9956486
24	Mon.	22 30 23.31	455	9 23 27.7	55.63	3.42518	11	10.3	13 28 25	.401	.9957536
25	Tues.	22 34 10.22	431	9 1 12.5	55.97	3.42788	11	10.1	13 18.63	.425	.9958602
26	Wed.	22 37 56.56	408	8 38 49.3	56.29	3.43041	10	9.9	13 8.44	.447	.9959685
27	Thur.	22 41 42.35	386	8 16 18.4	56.60	3.43284	10	9.6	12 57.71	.469	.9960783
28	Frid.	22 45 27.62	9.365	7 53 40.1	56.88	+3.43513	9	16 9.4	12 46.46	0.490	9.9961894

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MARCH.

Day of the Month.	Day of the Week.	At Greenwich Apparent Noon. SUN'S Right Ascension.	Diff. for 1 hour.	S. Declination.	Diff. for 1 hour.	Log. δ.1	Dif. for 1 hr.	Sun's Semi-diameter	Equa. of Time Add.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			′	m. s.	s.	
1	Sat.	22 49 12.39	9.345	7 30 54.9	57.16	+3.43727	8	16 9.1	12 34.70	0.510	9.9963017
2	Sun.	22 52 56.66	325	7 8 3.1	57.41	3.43929	8	8.9	12 22.45	.530	.9964150
3	Mon.	22 56 40.46	306	6 45 5.2	57.65	3.44115	7	8.6	12 9.74	.549	.9965291
4	Tues.	23 0 23.80	288	6 22 1.6	57 87	3.44289	7	8.4	11 56.56	.567	.9966440
5	Wed.	23 4 6.71	270	5 58 52.6	58.08	3.44448	6	8.1	11 42.95	.585	.9967595
6	Thur.	23 7 49.19	253	5 35 38.8	58.26	3.44593	6	7.8	11 28.92	.601	.9968754
7	Frid.	23 11 31.27	237	5 12 20.5	58.44	3.44728	5	7.6	11 14.49	.617	.9969917
8	Sat.	23 15 12.96	222	4 48 58.0	58.59	3.44849	4	7.3	10 59.67	.633	.9971082
9	Sun.	23 18 54.28	207	4 25 31.9	58.73	3.44956	4	7.1	10 44.48	.648	.9972249
10	Mon.	23 22 35 24	193	4 2 2.5	58.85	3.45051	3	6.8	10 28.92	.662	.9973418
11	Tues.	23 26 15.86	179	3 38 30.2	58.95	3.45134	3	6.6	10 13.03	.675	.9974589
12	Wed.	23 29 56.15	166	3 14 55.4	59.04	3.45205	2	6.3	9 56.82	.688	.9975762
13	Thur.	23 33 36.14	154	2 51 18.5	59.11	3.45263	2	6.0	9 40.30	.700	.9976937
14	Frid.	23 37 15.84	143	2 27 30.9	59.17	3.45310	2	5.8	9 23.49	.711	.9978116
15	Sat.	23 40 55.27	133	2 3 59.9	59.21	3.45347	1	5.5	9 6.42	.722	.9979299
16	Sun.	23 44 34.45	123	1 40 18.9	59.23	3.45372	1	5.2	8 49.00	.731	.9980487
17	Mon.	23 48 13.39	114	1 16 37.3	59.24	3.45384	0	5.0	8 31.54	.740	.9981681
18	Tues.	23 51 52.13	106	0 52 55.5	59.24	3.45387	0	4.7	8 13.77	.748	.9982882
19	Wed.	23 55 30.68	100	0 29 13.7	59.22	3.45381	1	4.4	7 55.82	.755	.9984091
20	Thur.	23 59 9.07	094	S. 5 32.3	59.19	3.45362	1	4.2	7 37.71	.760	.9985308
21	Frid.	0 2 47.33	089	N. 18 8.3	59.15	3.45333	2	3.9	7 19.46	.765	.9986533
22	Sat.	0 6 25.46	085	0 41 47.8	59.09	3.45295	2	3.6	7 1.09	.769	.9987767
23	Sun.	0 10 3.50	082	1 5 25.9	59.01	3.45245	2	3.3	6 42.63	.772	.9989010
24	Mon.	0 13 41 47	080	1 29 2.1	58.92	3.45185	3	3.1	6 24.09	.774	.9990262
25	Tues.	0 17 19.39	079	1 52 36.3	58.82	3.45116	3	2.8	6 5.5.	.775	.9991522
26	Wed.	0 20 57.29	080	2 16 8 0	58.70	3.45034	4	2.5	5 46.92	.775	.9992789
27	Thur.	0 24 35.21	081	2 39 36.9	58.58	3.44945	4	2.2	5 28.33	.773	.9994062
28	Frid.	0 28 13.15	083	3 3 2.8	58.43	3.44844	5	1.9	5 9.77	.771	.9995341
29	Sat.	0 31 51.14	086	3 26 25.2	58.27	3.44730	5	1 7	4 51.26	.768	.9996623
30	Sun.	0 35 29.20	090	3 49 43.7	58.10	3.44606	6	1.4	4 32.82	.765	.9997905
31	Mon.	0 39 7.35	9.004	4 12 58.1	57.91	+3.44472	6	16 1.1	4 14.46	0.760	9.9999188

APRIL.

Day of the Month.	Day of the Week.	At Greenwich Apparent Noon. SUN'S Right Ascension.	Diff. for 1 hour.	S. Declination.	Diff. for 1 hour.	Log. δ.1	Dif. for 1 hr.	Sun's Semi-diameter.	Equa. of Time Add.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			′	m. s.	s.	
1	Tues.	0 42 45.60	9.100	4 36 8.0	57.71	+3.44325	7	16 0.8	3 56.22	0.755	0.0000469
2	Wed	0 46 23.99	105	4 59 13.0	57.49	3.44165	7	0.5	3 38.10	.749	.0001747
3	Thur.	0 50 2.52	112	5 22 12.7	57.26	3.43905	8	0.2	3 20.13	.742	.0003020
4	Frid.	0 53 41.22	119	5 45 6.9	57.01	3.43813	8	16 0.0	3 2.32	.735	.0004289
5	Sat.	0 57 20.06	128	6 7 55.1	56.75	3.43613	9	15 59.7	2 44.68	.727	.0005550
6	Sun.	1 0 59 15	136	6 30 37.0	56.47	3.43411	9	59.4	2 27.24	.718	.0006803
7	Mon.	1 4 38.42	145	6 53 12 2	56.17	3.43189	10	59.1	2 10.01	.709	.0008047
8	Tues.	1 8 17.91	155	7 15 40.3	55.87	3.42957	10	58.9	1 53.00	.699	.0009283
9	Wed.	1 11 57.65	165	7 38 1.1	55.54	3.42711	11	58.6	1 36.22	.689	.0010508
10	Thur.	1 15 37.62	176	8 0 14.0	55.20	3.42452	11	58.3	1 19.69	.678	.0011724
11	Frid.	1 19 17.85	188	8 22 18.9	54.85	3.42182	12	58.0	1 3.41	.666	.0012932
12	Sat.	1 22 58.37	200	8 44 15.3	54.48	3.41896	12	57.8	0 47.42	.655	.0014131
13	Sun.	1 26 39.17	213	9 6 2.9	54.10	3.41599	13	57.5	0 31.71	.642	.0015324
14	Mon.	1 30 20.28	227	9 27 41.4	53.71	3.41288	14	57.3	0 16.31	.628	.0016512
15	Tues.	1 34 1.72	240	9 49 10.4	53.30	3.40963	14	57.0	add 1.24	.614	.0017693
16	Wed.	1 37 43.49	253	10 10 29.6	52.88	3.40627	15	56.7	sb.13.50	.600	.0018870
17	Thur.	1 41 25.61	271	10 31 38.8	52.45	3.40276	15	56.5	0 27.90	.584	.0020044
18	Frid.	1 45 8.11	287	10 52 37.5	52.00	3.39909	16	56.2	0 41.92	.568	.0021215
19	Sat.	1 48 50.98	304	11 13 25.4	51.54	3.39529	16	56.0	0 55.56	.551	.0022382
20	Sun.	1 52 34.27	321	11 34 2.3	51.06	3.39136	17	55.7	1 8.79	534	.0023548
21	Mon.	1 56 17.97	339	11 54 27.8	50 57	3.38728	18	55.4	1 21.61	.516	.0024712
22	Tues.	2 0 2 11	358	12 14 41.6	50.08	3.38304	18	55 2	1 33.99	.497	.0025874
23	Wed.	2 3 46.70	378	12 34 43.5	49.56	3.37865	19	54.9	1 45.92	.477	.0027035
24	Thur.	2 7 31.76	398	12 54 33.0	49.04	3.37409	20	54.7	1 57.38	457	.0028192
25	Frid.	2 11 17.31	419	13 14 9.9	48.50	3.36938	20	54.4	2 8.35	.436	.0029346
26	Sat.	2 15 3 37	440	13 33 33.9	47.95	3.36449	21	54.2	2 18.82	.415	.0030496
27	Sun.	2 18 49.93	462	13 52 44.6	47.38	3.35942	22	53.9	2 28.78	.394	.0031640
28	Mon.	2 22 37.01	485	14 11 41.7	46.80	3.35417	23	53.7	2 38 23	.371	.0032775
29	Tues.	2 26 24.64	507	14 30 24.9	46.21	3.34875	24	53.4	2 47.13	.348	.0033901
30	Wed.	2 30 12.81	9.530	14 48 54.0	45.60	+3.34311	24	15 53.2	2 55.49	0.326	0.0035016

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MAY.

Day of the Month.	Day of the Week.	At Greenwich Apparent Noon. SUN'S Right Ascension.	Dif. for 1 hour.	N. Declination.	Dif. for 1 hour.	Log. δ.1	Dif. for 1 hr.	Sun's Semi-diameter.	Equa. of Time Sub.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			° ′	m. s.	s.	
1	Thur.	2 34 1.53	9.553	15 7 8.4	44.98	+3.33724	25	15 52.9	3 3.31	0.303	0.0036118
2	Frid.	2 37 50.81	577	15 25 7.9	44 35	3.33120	26	52.7	3 10.57	.279	.0037208
3	Sat.	2 41 40.65	600	15 42 52.3	43.70	3.32494	27	52.5	3 17 26	.255	.0038292
4	*Sun.*	2 45 31.06	624	16 0 21.1	43.04	3.31844	28	52.2	3 23.39	.232	.0039340
5	Mon.	2 49 22.03	648	16 17 34.1	42.36	3 31169	29	52 0	3 28.95	.208	.0040382
6	Tues.	2 53 13.57	672	16 34 30.8	41.68	3.30471	30	51 8	3 33.95	.185	.0041405
7	Wed.	2 57 5.69	695	16 51 11.1	40.98	3.29750	31	51.6	3 38.38	.161	.0042410
8	Thur.	3 0 58.37	719	17 7 34.6	40.26	3.29000	32	51.4	3 42.24	.137	.0043396
9	Frid.	3 4 51.62	743	17 23 40.9	39.54	3.28221	33	51.1	3 45.54	.113	.0044363
10	Sat.	3 8 45 44	766	17 39 29.8	38.80	3.27418	35	50.9	3 48.26	.091	.0045312
11	*Sun.*	3 12 39.82	789	17 55 1 0	38.05	3.26586	36	50.7	3 50.44	.067	.0046242
12	Mon.	3 16 34.75	812	18 10 14.2	37.29	3.25722	37	50.5	3 52.06	.044	.0047157
13	Tues.	3 20 30.25	835	18 25 9.1	36.51	3.24824	39	50.3	3 53.11	.021	.0048055
14	Wed.	3 24 26.29	858	18 39 45.3	35.72	3 23895	40	50.1	3 53.62	.002	.0048939
15	Thur.	3 28 22.89	882	18 54 2.7	34.93	3.22935	42	49.9	3 53.57	.025	.0049809
16	Frid.	3 32 20.05	905	19 8 1.0	34.12	3.21935	43	49.8	3 52.97	.048	.0050667
17	Sat.	3 36 17.76	927	19 21 39.8	33.30	3.20900	45	49.6	3 51.83	.070	.0051513
18	*Sun.*	3 40 16.01	950	19 34 59.0	32.47	2.19824	47	49.4	3 50.14	.093	.0052349
19	Mon.	3 44 14 81	973	19 47 58.3	31.63	3.18704	48	49.2	3 47.90	.116	.0053172
20	Tues.	3 48 14.15	9.995	20 0 37 3	30.78	3.17542	50	49.0	3 45.12	.138	.0053985
21	Wed.	3 52 14.03	10.018	20 12 56.0	29.92	3.16337	52	48 9	3 41.80	.161	.0054789
22	Thur.	3 56 14 46	040	20 24 54.0	29.05	3.15079	55	48.7	3 37.94	.183	.0055583
23	Frid.	4 0 15.42	062	20 36 31.1	28.17	3.13770	57	48.5	3 33.55	.205	.0056367
24	Sat.	4 4 16.90	084	20 47 47.1	27.27	3.12405	60	48.3	3 28.64	.227	.0057141
25	*Sun.*	4 8 18.92	105	20 58 41.7	26.37	3.10975	62	48.2	3 23.20	.248	.0057903
26	Mon.	4 12 21.44	126	21 9 14.6	25.47	3 09486	65	48.0	3 17.24	.269	.0058651
27	Tues.	4 16 24.47	147	21 19 25.8	24.55	3.07929	68	47.8	3 10.79	.290	.0059386
28	Wed.	4 20 28.00	167	21 29 14.9	23.62	3.06296	71	47.7	3 3.84	.310	.0060104
29	Thur.	4 24 32.01	187	21 38 41.8	22.69	3.04587	75	47.5	2 56.40	.329	.0060805
30	Frid.	4 28 36.50	205	21 47 46.3	21.74	3.02784	79	47 4	2 48.50	.348	.0061487
31	Sat.	4 32 41.43	10.224	21 56 28.0	20.79	+3.00886	84	15 47.3	2 40.14	0.366	0.0062149

JUNE.

Day of the Month.	Day of the Week.	At Greenwich Apparent Noon. SUN'S Right Ascension.	Dif. for 1 hour.	N. Declination.	Dif. for 1 hour.	Log. δ.1	Dif. for 1 hr.	Sun's Semi-diameter.	Equa. of Time Sub.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			° ′	m. s.	s.	
1	*Sun.*	4 36 46.80	10.241	22 4 46.9	19.83	+2.9800	9	15 47.1	2 31.35	0.384	0.0062789
2	Mon.	4 40 52.59	.258	22 12 42.8	18.86	2.9678	9	47.0	2 22.14	.400	.0063409
3	Tues.	4 44 58.78	.274	22 20 15.5	17.88	2.9455	10	46.8	2 12.54	.416	.0064005
4	Wed.	4 49 5.35	.288	22 27 24.7	16.91	2.9217	11	46.7	2 2.55	.430	.0064578
5	Thur.	4 53 12.26	.302	22 34 10.5	15.92	2.8964	11	46.6	1 52.23	.444	.0065125
6	Frid.	4 57 19.51	.315	22 40 32.5	14.93	2.8694	12	46.5	1 41.56	.457	.0065648
7	Sat.	5 1 27.07	.327	22 46 30 8	13.93	2.8404	13	46.4	1 30.59	.469	0066146
8	*Sun.*	5 5 34.91	.338	22 52 5 0	12.93	2.8092	14	46.3	1 19.34	.480	.0066619
9	Mon.	5 9 43 01	.347	22 57 15.2	11.92	2.7753	15	46.2	1 7.83	.489	.0067069
10	Tues.	5 13 51.33	.356	23 2 1.2	10.90	2.7386	17	46 1	0 56.10	.498	.0067495
11	Wed.	5 17 59.87	.364	23 6 22.9	9.89	2.6982	19	46.0	0 44.15	.506	.0067901
12	Thur.	5 22 8.60	.371	23 10 20.3	8.87	2.6535	21	45.9	0 32.00	.513	.0068286
13	Frid.	5 26 17.50	.377	23 13 53.1	7.85	2.6033	24	45.8	0 19.70	.519	.0068651
14	Sat.	5 30 26.54	.382	23 17 1.5	6.82	2.5466	27	45.8	sub.7.25	.524	.0068998
15	*Sun.*	5 34 35.70	.386	23 19 45.2	5.79	2.4810	32	45.7	add 5.32	.528	.0069328
16	Mon.	5 38 44.96	.390	23 22 4.2	4.77	2.4038	39	45.6	0 17.99	.531	.0069641
17	Tues.	5 42 54.31	.392	23 23 58.6	3.74	2.3098	50	45.6	0 30.74	.534	.0069939
18	Wed.	5 47 3.72	.394	23 25 28.3	2.70	2.1889	70	45.5	0 43.56	.536	.0070222
19	Thur.	5 51 13.17	.394	23 26 33.1	1 67	2.0208	116	45.4	0 56.42	.536	.0070491
20	Frid.	5 55 22.63	.395	23 27 13.2	0.63	1.7427	411	45.4	1 9.20	.537	.0070745
21	Sat.	5 59 32 11	.394	23 27 28.4	0 40	+0.7559		45.3	1 22.17	.536	.0070985
22	*Sun.*	6 3 41.57	.392	23 27 18.9	1.43	−1.6425	137	45.3	1 35.04	.535	.0071212
23	Mon.	6 7 50.99	.390	23 26 44.5	2.47	1 9713	77	45.2	1 47.87	.533	.0071424
24	Tues.	6 12 0.36	.387	23 25 45.3	3.50	2.1556	54	45.2	2 0.65	.529	.0071619
25	Wed.	6 16 9 65	.383	23 24 21.4	4.53	2.2846	44	45.2	2 13.35	.525	.0071798
26	Thur.	6 20 18.85	.378	23 22 32.7	5.56	2.3840	33	45.1	2 25.96	.520	.0071957
27	Frid.	6 24 27.92	.372	23 20 19.3	6.58	2.4643	28	45.1	2 38.44	.514	.0072097
28	Sat.	6 28 36.86	.365	23 17 41.4	7.61	2.5321	24	45.1	2 50 78	.507	.0072216
29	*Sun.*	6 32 45.62	.357	23 14 38.8	8.63	2.5907	21	45.0	3 2.95	.499	0072314
30	Mon.	6 36 54.19	10.348	23 11 11.8	9.64	−2.6419	19	15 45.0	3 14.93	0.491	0.0072389

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Day of the Month.	Day of the Week.	At Greenwich Apparent Noon. SUN'S Right Ascension.	Diff. for 1 hour.	N. Declination.	Dif. for 1 hour.	Log. δ.1	Dif for 1 hr.	Sun's Semi-diameter.	Equa. of Time Add.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			° ′	m. s.	s.	
1	Tues.	6 41 2.55	10.339	23 7 20.4	10.65	−2.68762	172	15 45.0	3 26.71	0.480	0.0072439
2	Wed.	6 45 10.68	327	23 3 4.7	11 66	2.72884	156	45.0	3 38.24	.469	0.0072464
3	Thur.	6 49 18.53	315	22 58 24.8	12.66	2.76626	143	45.0	3 49.50	.457	0.0072463
4	Frid.	6 53 26.10	302	22 53 20.9	13.66	2.80051	132	45.0	4 0.48	.445	0.0072436
5	Sat.	6 57 33.35	288	22 47 53.1	14.65	2.83213	122	45.0	4 11.15	.430	0.0072382
6	*Sun.*	7 1 40.25	273	22 42 1.5	15.63	2.86141	113	45.0	4 21.47	.415	0.0072301
7	Mon.	7 5 46.80	257	22 35 46.3	16.61	2.88863	106	45.1	4 31.43	.399	0.0072194
8	Tues.	7 9 52.96	240	22 29 7.7	17.58	2.91408	100	45.1	4 41.01	.382	0.0072063
9	Wed.	7 13 58.71	222	22 22 5.8	18.55	2.93802	94	45.1	4 50.18	.364	0.0071906
10	Thur.	7 18 4.04	203	22 14 40.7	19.50	2.96047	88	45.2	4 58.92	.346	0.0071725
11	Frid.	7 22 8.92	184	22 6 52.8	20.45	2.98164	83	45.2	5 7.22	.327	0.0071522
12	Sat.	7 26 13.33	164	21 58 42.1	21.39	3.00173	79	45.3	5 15.06	.307	0.0071298
13	*Sun.*	7 30 17.27	143	21 50 8.8	22.32	3.02078	75	45.3	5 22.42	.286	0.0071054
14	Mon.	7 34 20.71	122	21 41 13.1	23.24	3.03882	71	45.4	5 29.29	.265	0.0070792
15	Tues.	7 38 23.65	101	21 31 55.3	24.15	3.05595	68	45.4	5 35.66	.243	0.0070512
16	Wed.	7 42 26.07	079	21 22 15.6	25.07	3.07236	65	45.5	5 41.50	.222	0.0070217
17	Thur.	7 46 27.97	057	21 12 14.0	25.96	3.08803	62	45.6	5 46.83	.200	0.0069906
18	Frid.	7 50 29.35	035	21 1 50.9	26.85	3.10295	60	45.6	5 51.64	.178	0.0069581
19	Sat.	7 54 30.18	10.012	20 51 6.5	27.73	3.11727	57	45.7	5 55.90	.155	0.0069242
20	*Sun.*	7 58 30.46	9.989	20 40 0.9	28.60	3.13101	55	45.7	5 59.62	.132	0.0068889
21	Mon.	8 2 30 20	966	20 28 34.4	29.46	3.14411	53	45 8	6 2.79	.109	0.0068523
22	Tues.	8 6 29.38	943	20 16 47.3	30.32	3.15676	51	45.9	6 5.41	.086	0.0068143
23	Wed.	8 10 28.00	919	20 4 39.7	31.16	3.16891	49	46.0	6 7.47	.062	0.0067748
24	Thur.	8 14 26.06	895	19 52 11.9	31.99	3.18058	47	46.1	6 8.96	.039	0.0067337
25	Frid.	8 18 23.55	872	19 39 24.2	32.81	3.19176	45	46.2	6 9.90	.015	0.0066910
26	Sat.	8 22 20.48	848	19 26 16.8	33.62	3.20257	43	46.3	6 10.26	.008	0.0066465
27	*Sun.*	8 26 16.83	823	19 12 49.9	34.42	3.21293	42	46.4	6 10.06	.033	0.0066001
28	Mon.	8 30 12.59	799	18 59 4.0	35.20	3.22290	40	46.5	6 9.27	.057	0.0065518
29	Tues.	8 34 7.77	775	18 44 59.2	35.98	3.23254	39	46·6	6 7.90	.082	0.0065014
30	Wed.	8 38 2.37	750	18 30 35.8	36.74	3.24182	38	46.8	6 5.95	.106	0.0064488
31	Thur.	8 41 56.38	9.725	18 15 54.1	37.49	−3.25076	36	15 46.9	6 3.41	0.130	0.0063938

AUGUST.

Day of the Month.	Day of the Week.	At Greenwich Apparent Noon. SUN'S Right Ascension.	Diff. for 1 hour.	N. Declination.	Dif. for 1 hour.	Log. δ.1	Dif. for 1 hr.	Sun's Semi-diameter.	Equa. of Time Add.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			° ′	m. s.	s.	
1	Frid.	8 45 49.79	9.700	18 0 54.4	38.23	−3.25938	35	15 47.0	6 0.28	0.156	0.0063365
2	Sat	8 49 42.60	.675	17 45 37.0	38.95	3.26766	33	47.1	5 56.54	.180	0.0062769
3	*Sun.*	8 53 34.81	.650	17 30 2.3	39.66	3.27566	32	47.3	5 52.21	.205	0.0062148
4	Mon.	8 57 26.42	.625	17 14 10.5	40.35	3.28337	31	47.4	5 47.28	.231	0.0061503
5	Tues.	9 1 17.43	.600	16 58 2.0	41.04	3.29079	30	47.5	5 41.74	.256	0.0060835
6	Wed.	9 5 7.83	.575	16 41 37.1	41.71	3.29798	29	47.7	5 35.60	.281	0.0060143
7	Thur.	9 8 57.62	.549	16 24 56.0	42.37	3.30492	28	47.8	5 28.86	.306	0.0059430
8	Frid.	9 12 46.80	.525	16 7 59.1	43.01	3.31158	27	48.0	5 21.51	.331	0.0058695
9	Sat.	9 16 35.39	.500	15 50 46.8	43.65	3.31804	26	48.2	5 13.56	.356	0.0057942
10	*Sun.*	9 20 23.38	.475	15 33 19.2	44.27	3.32428	25	48.3	5 5.02	.380	0.0057171
11	Mon.	9 24 10.78	.450	15 15 36.8	44.88	3.33029	24	48.5	4 55.89	.405	0.0056384
12	Tues.	9 27 57.59	.427	14 57 39.8	45.47	3.33612	23	48.7	4 46.18	.429	0.0055580
13	Wed.	9 31 43.83	.404	14 39 28.5	46.05	3.34173	23	48 9	4 35.89	.452	0.0054762
14	Thur.	9 35 29.52	.380	14 21 3.3	46.62	3.34715	22	49.0	4 25.05	.475	0.0053932
15	Frid.	9 39 14.64	.358	14 2 24.4	47.18	3.35241	21	49.2	4 13.65	.497	0.0053091
16	Sat.	9 42 59.23	.336	13 43 32.1	47.73	3.35750	20	49.4	4 1.72	.519	0.0052239
17	*Sun.*	9 46 43.29	.315	13 24 26.7	48.26	3.36241	20	49.6	3 49.26	.540	0.0051378
18	Mon.	9 50 26.84	.294	13 5 8.5	48.78	3.36715	19	49.8	3 36.29	.561	0.0050508
19	Tues.	9 54 9.90	.274	12 45 37.8	49.28	3.37171	18	50.0	3 22.83	.581	0.0049629
20	Wed.	9 57 52 47	.255	12 25 55.0	49.78	3.37614	18	50.2	3 8.88	.600	0.0048740
21	Thur.	10 1 34.58	.236	12 6 0.2	50 27	3.38043	17	50.4	2 54.48	.619	0.0047842
22	Frid.	10 5 16.24	.218	11 45 53.8	50.73	3.38453	17	50.6	2 39.63	.637	0.0046935
23	Sat.	10 8 57.46	.201	11 25 36.2	51.20	3.38851	16	50.8	2 24.34	.654	0.0046018
24	*Sun.*	10 12 38.28	.184	11 5 7.5	51.64	3.39235	15	51.0	2 8.65	.671	0.0045090
25	Mon.	10 16 18.69	.168	10 44 28.2	52.07	3.39601	15	51.2	1 52.55	.687	0.0044148
26	Tues.	10 19 58.71	.152	10 23 38.6	52.49	3.39955	14	51.4	1 36.06	.702	0.0043193
27	Wed.	10 23 38.36	.137	10 2 38.9	52.89	3.40295	14	51.6	1 19.20	.717	0.0042223
28	Thur.	10 27 17.65	.123	9 41 29.6	53.28	3.40620	13	51.8	1 1.98	.731	0.0041238
29	Frid.	10 30 56.59	.109	9 20 10.9	53.65	3.40932	12	52.0	0 44.43	.745	0.0040237
30	Sat.	10 34 35.20	.095	8 58 43.2	54.01	3.41229	12	52.3	0 26.54	.759	0.0039219
31	*Sun.*	10 38 13.49	9.083	8 37 6.9	54.36	−3.41512	11	15 52.5	0 8.32	0.772	0.0038184

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SEPTEMBER.

Day of the Month.	Day of the Week.	At Greenwich Apparent Noon. SUN'S Right Ascension.	Diff. for 1 hour.	N. Declination.	Dif. for 1 hour.	Log. δ.1	Dif for 1 hr.	Sun's Semi-diameter.	Equa. of Time Sub.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			′ ″	m. s.	s.	
1	Mon.	10 41 51.48	9.070	8 15 22.3	54.70	—3.41785	11	15 52.7	0 10.20	0.783	0.0037132
2	Tues.	10 45 29.17	.059	7 53 29.6	55 01	3.42043	10	53.0	0 29.00	.795	.0036062
3	Wed.	10 49 6.58	.048	7 31 29.4	55.31	3.42287	10	53.2	0 48.09	.807	.0034976
4	Thur.	10 52 43.73	.037	7 9 21.9	55.60	3.42521	9	53.4	1 7.45	.817	.0033874
5	Frid.	10 56 20.62	.027	6 47 7.4	55.88	3.42740	9	53.7	1 27.05	.827	.0032756
6	Sat.	10 59 57.27	.018	6 24 46.4	56.14	3.42948	8	53.9	1 46.90	.836	.0031624
7	*Sun.*	11 3 33.71	.010	6 2 19.1	56.39	3.43146	8	54.2	2 6.97	.844	.0030478
8	Mon.	11 7 9.94	9.002	5 39 45.8	56.62	3.43332	7	54.4	2 27.23	.852	.0029321
9	Tues.	11 10 45.98	8.994	5 17 6.9	56.84	3.43505	7	54.7	2 47.69	.860	.0028154
10	Wed.	11 14 21.84	.988	4 54 22.8	57.05	3.43667	6	55.0	3 8.32	.866	.0026979
11	Thur.	11 17 57.56	.983	4 31 33.7	57.24	3.43821	6	55.2	3 29.10	.871	.0025798
12	Frid.	11 21 33.15	.979	4 8 39.9	57.42	3.43963	6	55.5	3 50.00	.875	.0024611
13	Sat.	11 25 8.64	.975	3 45 41.8	57.59	3.44094	5	55.7	4 11.01	.879	.0023421
14	*Sun.*	11 28 44.04	.972	3 22 39.7	57.74	3.44215	5	56.0	4 32.10	.882	.0022228
15	Mon.	11 32 19.38	.971	2 59 33.9	57.88	3.44326	4	56.3	4 53.26	.883	.0021033
16	Tues.	11 35 54.68	.970	2 36 24.7	58.01	3.44428	4	56.5	5 14.45	.884	.0019838
17	Wed.	11 39 29.97	.970	2 13 12.4	58.13	3.44520	3	56.8	5 35.66	.883	.0018641
18	Thur.	11 43 5.26	.972	1 49 57.3	58.23	3.44601	3	57.1	5 56.86	.882	.0017445
19	Frid.	11 46 40.59	.975	1 26 39.8	58.32	3.44672	3	57.3	6 18.02	.880	.0016248
20	Sat.	11 50 15.98	.978	1 3 20.1	58.39	3.44733	2	57.6	6 39.13	.876	.0015050
21	*Sun.*	11 53 51.45	.982	0 39 58.7	58.46	3.44784	2	57.9	7 0.15	.872	.0013852
22	Mon.	11 57 27.02	.987	N. 16 35.7	58.50	3.44826	1	58.1	7 21.08	.867	.0012652
23	Tues.	12 1 2.71	8.994	S. 6 48.4	58.54	3.44855	1	58.4	7 41.88	.860	.0011451
24	Wed.	12 4 38.56	9.001	0 30 13.3	58.55	3.44874	0	58.6	8 2.52	.854	.0010245
25	Thur.	12 8 14.57	.008	0 53 38.6	58.56	3.44883	0	58.9	8 23.01	.846	.0009034
26	Frid.	12 11 50.77	.017	1 17 4.1	58.55	3.44880	1	59.2	8 43.30	.837	.0007818
27	Sat.	12 15 27.18	.026	1 40 29.2	58.52	3.44864	1	59.5	9 3.39	.828	.0006596
28	*Sun.*	12 19 3.81	.036	2 3 53.7	58.48	3.44842	1	15 59.7	9 23.27	.818	.0005366
29	Mon.	12 22 40.68	.047	2 27 17.3	58.42	3.44806	2	16 0.0	9 42.89	.807	.0004129
30	Tues.	12 26 17.82	9.059	2 50 39.5	58.35	—3.44756	2	16 0.3	10 2.25	0.795	0.0002885

OCTOBER.

Day of the Month.	Day of the Week.	At Greenwich Apparent Noon. SUN'S Right Ascension.	Diff. for 1 hour.	S. Declination.	Dif. for 1 hour.	Log. δ.1	Dif. for 1 hr.	Sun's Semi-diameter.	Equa. of Time Sub.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			′ ″	m. s.	s.	
1	Wed.	12 29 55.23	9.071	3 13 59.9	58.26	—3.44696	3	16 0.5	10 21.34	0.783	0.0001634
2	Thur.	12 33 32.93	.083	3 37 18.2	58.16	3.44624	3	0.8	10 40.14	.771	0.0000376
3	Frid.	12 37 10.93	.097	4 0 34.0	58.04	3.44540	4	1.1	10 58.64	.757	9.9999111
4	Sat.	12 40 49.27	.112	4 23 46.9	57.90	3.44445	4	1.4	11 16.81	.743	.9997840
5	*Sun.*	12 44 27.95	.126	4 46 56.6	57.75	3.44339	5	1.7	11 34.63	.728	.9996564
6	Mon.	12 48 6.98	.142	5 10 2.7	57.59	3.44220	6	2.0	11 52.11	.712	.9995285
7	Tues.	12 51 46.40	.159	5 33 4.8	57.41	3.44089	6	2.2	12 9.19	.695	.9994004
8	Wed.	12 55 26.21	.176	5 56 2.6	57.21	3.43946	7	2.5	12 25.88	.679	.9992723
9	Thur.	12 59 6.43	.194	6 18 55.6	57.00	3.43789	7	2.8	12 42.17	.661	.9991444
10	Frid.	13 2 47.08	.213	6 41 43.5	56.77	3.43623	8	3.1	12 58.03	.641	.9990167
11	Sat.	13 6 28.20	.233	7 4 26.0	56.53	3.43444	8	3.4	13 13.42	.622	.9988894
12	*Sun.*	13 10 9.78	.254	7 27 2.7	56.27	3.43254	9	3.6	13 28.35	.601	.9987628
13	Mon.	13 13 51.87	.275	7 49 33.3	56.00	3.43049	9	3.9	13 42.78	.580	.9986370
14	Tues.	13 17 34.47	.297	8 11 57.3	55.71	3.42831	10	4 2	13 56.70	.557	.9985120
15	Wed.	13 21 17.61	.321	8 34 14.4	55.41	3.42601	10	4.5	14 10.07	.534	.9983879
16	Thur.	13 25 1.31	.345	8 56 24.2	55.10	3.42359	11	4.8	14 22.88	.510	.9982648
17	Frid.	13 28 45.60	.370	9 18 26.5	54.76	3.42103	11	5.0	14 35.12	.485	.9681428
18	Sat.	13 32 30.49	.396	9 40 20.7	54.41	3.41832	12	5.3	14 46.75	.459	.9980218
19	*Sun.*	13 36 16.00	.423	10 2 6.5	54.05	3.41547	12	5.6	14 57.76	.432	.9979019
20	Mon.	13 40 2.15	.451	10 23 43.6	53.67	3.41249	13	5.8	15 8.13	.404	.9977830
21	Tues.	13 43 48.98	.479	10 45 11.6	53.27	3.40934	14	6.1	15 17.83	.376	.9976650
22	Wed.	13 47 36.48	.508	11 6 30.0	52.86	3.40603	14	6.4	15 26.86	.347	.9975480
23	Thur.	13 51 24.68	.538	11 27 38.6	52.43	3.40257	15	6.6	15 35.19	.317	.9974317
24	Frid.	13 55 13.60	.568	11 48 36.8	51.97	3.39893	16	6.9	15 42.80	.287	.9973161
25	Sat.	13 59 3.24	.599	12 9 24.3	51.51	3.39512	17	7.1	15 49.70	.256	.9972012
26	*Sun.*	14 2 53.62	.631	12 30 0.6	51.03	3.39113	17	7.4	15 55.85	.225	.9970867
27	Mon.	14 6 44.76	.663	12 50 25.4	50.53	3.38696	18	7.6	16 1.25	.193	.9969727
28	Tues.	14 10 36.66	.695	13 10 38.2	50.02	3.38261	19	7.9	16 5.89	.161	.9968591
29	Wed.	14 14 29.34	.727	13 30 38.7	49.48	3.37805	20	8.1	16 9.76	.129	.9967458
30	Thur.	14 18 22.78	.760	13 50 26.3	48.93	3.37328	21	8.4	16 12.86	.097	.9966329
31	Frid.	14 22 17.01	9.793	14 10 0.7	48.37	3.36832	22	16 8.6	16 15.18	0.064	9.9965204

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NOVEMBER.

Day of the Month.	Day of the Week.	At Greenwich Apparent Noon. SUN'S Right Ascension.	Diff. for 1 hour.	S. Declination.	Dif. for 1 hour.	Log. δ.1	Dif. for 1 hr.	Sun's Semi-diameter.	Equa. of Time Sub.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. o. Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			° ′	m. s.	s.	
1	Sat.	14 26 12.03	9.826	14 20 21.5	47.78	−3 36314	23	16 8.9	16 16 71	0.030	9.9964084
2	*Sun.*	14 30 7.86	.859	14 48 23.2	47.18	3.35773	24	9.1	16 17.43	.003	.9962968
3	Mon.	14 34 4.48	.893	15 7 20.4	46.55	3.35207	24	9.4	16 17.37	.036	.9961857
4	Tues.	14 38 1.90	.927	15 25 57.6	45.92	3.34620	25	9.6	16 16.50	.070	.9960753
5	Wed.	14 42 0.14	.960	15 44 19.6	45.26	3.34011	27	9.9	16 14.82	.104	.9959657
6	Thur.	14 45 59.19	9.995	16 2 25.9	44.59	3.33373	28	10.1	16 12.33	.138	.9958570
7	Frid.	14 49 59.06	10.029	16 20 16.0	43.90	3.32707	29	10.4	16 9.03	.172	.9957495
8	Sat.	14 53 59.75	.063	16 37 49.5	43.20	3.32019	30	10.6	16 4.90	.206	.9956432
9	*Sun.*	14 58 1.27	.098	16 55 6.2	42.47	3.31302	31	10.8	15 59.95	.241	.9955384
10	Mon.	15 2 3.62	.133	17 12 5.5	41.73	3.30552	32	11.1	15 54.17	.275	.9954352
11	Tues.	15 6 6.80	.168	17 28 47.0	40.98	3.29776	34	11.3	15 47.56	.310	.9953339
12	Wed.	15 10 10.82	.203	17 45 10.5	40.20	3.28968	35	11.5	15 40.12	.345	.9952343
13	Thur.	15 14 15.69	.238	18 1 15.4	39.42	3.28126	36	11.7	15 31.83	.381	.9951367
14	Frid.	15 18 21.41	.273	18 17 1.5	38.62	3.27251	38	11.9	15 22.69	.416	.9950411
15	Sat.	15 22 27.97	.309	18 32 28.3	37.80	3.26338	40	12.2	15 12.71	.451	.9949476
16	*Sun.*	15 26 35.39	.344	18 47 35.4	36.96	3.25387	41	12.4	15 1.88	.486	.9948561
17	Mon.	15 30 43.65	.379	19 2 22.5	36.11	3.24398	43	12.6	14 50.21	.522	.9947668
18	Tues.	15 34 52.75	.415	19 16 49.2	35.25	3.23366	45	12.8	14 37.69	.557	.9946794
19	Wed.	15 39 2.70	.450	19 30 55.1	34.36	3.22287	47	13.1	14 24.33	.592	.9945940
20	Thur.	15 43 13.49	.485	19 44 39.8	33.47	3.21165	49	13.4	14 10.13	.626	.9945107
21	Frid.	15 47 25.12	.518	19 58 3.1	32.55	3.19992	51	13.3	13 55.11	.660	.9944293
22	Sat.	15 51 37.56	.552	20 11 4.4	31.62	3.18761	53	13.5	13 39.26	.694	.9943497
23	*Sun.*	15 55 50.82	.586	20 23 43.4	30.69	3.17479	56	13.7	13 22.61	.727	.9942716
24	Mon.	16 0 4.88	.618	20 35 59.9	29.73	3.16137	59	13.8	13 5.16	.760	.9941950
25	Tues.	16 4 19.72	.650	20 47 53.4	28.76	3.14727	62	14.0	12 46.92	.792	.9941197
26	Wed.	16 8 35.33	.682	20 59 23.6	27.77	3.13248	65	14.2	12 27.92	.823	.9940456
27	Thur.	16 12 51.69	.712	21 10 30.1	26.77	3.11697	68	14.3	12 8.17	.853	.9939729
28	Frid.	16 17 8.78	.741	21 21 12.7	25.76	3.10068	72	14.5	11 47.69	.882	.9939016
29	Sat.	16 21 26.57	.770	21 31 31.0	24.74	3.08350	75	14.6	11 26.52	.910	.9938316
30	*Sun.*	16 25 45.04	10.797	21 41 24.7	23.70	−3 06539	79	16 14.8	11 4.67	0.938	9.9937628

DECEMBER.

Day of the Month.	Day of the Week.	At Greenwich Apparent Noon. SUN'S Right Ascension.	Diff. for 1 hour.	S. Declination.	Dif. for 1 hour.	Log. δ.1	Dif. for 1 hr.	Sun's Semi-diameter.	Equa. of Time Sub.	Dif. for 1 hour.	At Greenw'h Mean Noon. log. of Earth's Radius Vector
		h. m. s.	s.	° ′ ″	″			° ′	m. s.	s.	
1	Mon.	16 30 4.17	10.823	21 50 53.5	22.65	−3.0463	8	16 15.0	10 42.15	0.964	9.9936954
2	Tues.	16 34 23.93	.849	21 59 57.1	21.59	3.0260	9	15.1	10 19.01	0.990	.9936294
3	Wed.	16 38 44 30	.873	22 8 35.2	20.52	3.0045	9	15.3	9 55.26	1.014	.9935649
4	Thur.	16 43 5.25	.896	22 16 47.6	19.43	2.9818	10	15.4	9 30.93	.036	.9935019
5	Frid.	16 47 26.75	.918	22 24 34.0	18.34	2.9574	11	15.5	9 6.06	.058	.9934406
6	Sat.	16 51 48.77	.938	22 31 54.2	17.24	2.9315	12	15.7	8 40.67	.079	.9933811
7	*Sun.*	16 56 11.20	.958	22 38 48.0	16.13	2.9035	13	15.8	8 14.78	.099	.9933236
8	Mon.	17 0 34.28	.977	22 45 15.0	15.01	2.8734	14	15.9	7 48.41	.117	.9932682
9	Tues.	17 4 57.72	10.994	22 51 15.2	13.88	2.8409	15	16.0	7 21.60	.134	.9932151
10	Wed.	17 9 21.57	11.010	22 56 48.4	12.75	2.8056	16	16.2	6 54.38	.150	.9931646
11	Thur	17 13 45.82	.025	23 1 54.3	11.60	2.7666	18	16.3	6 26.77	.166	.9931166
12	Frid.	17 18 10.43	.039	23 6 32.7	10.45	2.7237	20	16.4	5 58.79	.179	.9930712
13	Sat.	17 22 35 37	.052	23 10 43.6	9.30	2.6760	23	16.5	5 30.49	.192	.9930284
14	*Sun.*	17 27 0.62	.064	23 14 26.9	8.14	2 6219	26	16 6	5 1.87	.204	.99298e3
15	Mon.	17 31 26.16	.075	23 17 42.3	6.97	2.5595	30	16.6	4 32.97	.215	.9929509
16	Tues.	17 35 51.95	.084	23 20 29.6	5.81	2.4867	36	16.7	4 3.82	.224	.9929164
17	Wed.	17 40 17.96	.092	23 22 49.0	4.63	2.3989	46	16.8	3 34.44	.232	.9928845
18	Thur	17 44 44.17	.099	23 24 40.2	3.46	2.2880	62	16.8	3 4.87	.238	.9928552
19	Frid.	17 49 10.54	.104	23 26 3.2	2.28	2.1390	96	16.9	2 35.15	.244	.9928285
20	Sat.	17 53 37.04	.108	23 26 57.9	1.10	1.9096	217	17.0	2 5.28	.248	.9928043
21	*Sun.*	17 58 3.64	.111	23 27 24.4	0.08	−1.3892		17.0	1 35.32	.251	.9927825
22	Mon.	18 2 30.30	.112	23 27 22.4	1.26	+1.5079	184	17.1	1 5.30	.253	.9927628
23	Tues.	18 6 57 00	.112	23 26 52.2	2.44	1.9484	89	17.1	0 35.24	.252	.9927453
24	Wed.	18 11 23.69	.110	23 25 53.6	3.62	2.1629	59	17.1	S 5 19	.250	.9927298
25	Thur.	18 15 50.32	.107	23 24 26.7	4.80	2.3056	45	17.2	A 24.80	247	.9927162
26	Frid.	18 20 16.88	.102	23 22 31.5	5.98	2 4126	36	17.2	0 54.72	.242	.9927042
27	Sat.	18 24 43 32	.095	23 20 8.1	7.15	2.4983	30	17.2	1 24.53	.235	.9926939
28	*Sun.*	18 29 9.61	.087	23 17 16.5	8.32	2.5696	25	17.2	1 54.17	.227	.9926854
29	Mon.	18 33 35.70	.077	23 13 56.9	9.48	2.6305	22	17.3	2 23.63	.217	.9926786
30	Tues.	18 38 1.55	.066	23 10 9.4	10.64	2.6838	20	17.3	2 52.84	.206	.9926735
31	Wed.	18 42 27.13	11.054	23 5 54.0	11.79	+2.7311	18	16 17.3	3 21.79	1.194	9.9926701

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1845.] JANUARY.

Greenwich Mean Time		Moon's Right Ascension	Moon's Declination	Hor. Par.
d.	h.	h. m. s.	° ′ ″	′ ″
1	0	12 27 20.13	S. 7 35 42.3	57 43.7
	12	12 53 2.08	9 53 38.0	58 7.6
2	0	13 19 28.45	12 5 51.8	58 32.0
	12	13 46 42.80	14 10 21.9	58 56.4
3	0	14 14 49.62	16 4 36.9	59 20.0
	12	14 43 50.97	17 46 9.5	59 42.7
4	0	15 13 46.34	19 12 26.2	60 3.8
	12	15 44 32.05	20 20 57.6	60 22.7
5	0	16 16 1.06	21 9 28.9	60 38.8
	12	16 48 2.94	21 36 8.5	60 51.3
6	0	17 20 24.44	21 29 44.4	60 59.8
	12	17 52 50.61	21 19 47.0	61 4.0
7	0	18 25 6.16	20 36 37.8	61 3.6
	12	18 56 56.40	19 31 26.4	60 58.4
8	0	19 28 11.05	18 6 5.6	60 48.6
	12	19 58 39.91	16 23 1.3	60 34.7
9	0	20 28 18.28	14 25 1.2	60 16.5
	12	20 57 4.19	12 15 1.7	59 54.9
10	0	21 24 58.46	9 56 0.1	59 30.5
	12	21 52 4.08	7 30 44.5	59 4.0
11	0	22 18 25.64	5 1 51.0	58 35.8
	12	22 44 8.68	2 31 39.9	58 7.0
12	0	23 9 19.36	S. 0 2 12.9	57 38.1
	12	23 34 3.97	N. 2 24 30.9	57 9.7
13	0	23 58 28.86	4 47 24.5	56 42.1
	12	0 22 39.99	7 4 39.6	56 16.5
14	0	0 46 43.04	9 15 12.8	55 52.5
	12	1 10 43.11	11 17 50.3	55 30.4
15	0	1 34 44.79	13 12 1.5	55 10.8
	12	1 58 51.92	14 56 25.7	54 53.5
16	0	2 23 7.53	16 30 22.0	54 38.8
	12	2 47 33.39	17 53 3.5	54 26.6
17	0	3 12 12.33	19 3 47.0	54 17.1
	12	3 37 3.22	20 1 52.8	54 9.7
18	0	4 2 6.03	20 46 44.7	54 4.6
	12	4 27 19.33	21 17 52.7	54 1.8
19	0	4 52 40.84	21 34 53.6	54 1.2
	12	5 18 7.69	21 37 30.8	54 2.3
20	0	5 43 36.64	21 25 38.0	54 5.5
	12	6 9 4.19	20 59 18.0	54 10.0
21	0	6 34 26.99	20 18 44.1	54 16.1
	12	6 59 41.98	19 24 20.3	54 23.5
22	0	7 24 46.67	18 16 40.3	54 32.1
	12	7 49 39.33	16 56 27.7	54 41.8
23	0	8 14 19.02	15 24 33.5	54 52.4
	12	8 38 45.83	13 41 57.5	55 3.9
24	0	9 3 0.66	11 49 45.0	55 16.2
	12	9 27 5.33	9 49 6.7	55 29.1
25	0	9 51 2.55	7 41 17.7	55 42.7
	12	10 14 55.71	5 27 36.5	55 56.7
26	0	10 38 48.88	3 9 25.2	56 11.3
	12	11 2 46.70	N. 0 48 9.5	56 26.4
27	0	11 26 54.26	S. 1 34 42.1	56 41.9
	12	11 51 16.98	3 57 36.7	56 57.9
28	0	12 16 0.48	6 18 56.8	57 14.4
	12	12 41 10.36	8 37 0.0	57 31.1
29	0	13 6 52.06	10 49 57.7	57 48.0
	12	13 33 10.52	12 55 55.2	58 5.2
30	0	14 0 9.93	14 52 52.0	58 22.6
	12	14 27 53.17	16 38 42.8	58 39.9
31	0	14 56 21.55	18 11 20.0	58 56.8
	12	15 25 34.36	S. 19 28 37.3	59 13.0

FEBRUARY.

Greenwich Mean Time		Moon's Right Ascension	Moon's Declination	Hor. Par.
d.	h.	h. m. s.	° ′ ″	′ ″
1	0	15 55 28.43	S. 20 28 34.9	59 28.2
	12	16 25 58.00	21 9 27.4	59 42.3
2	0	16 56 54.95	21 29 48.6	59 54.6
	12	17 28 9.03	21 28 42.3	60 4.7
3	0	17 59 28.79	21 5 45.7	60 12.1
	12	18 30 42.42	20 21 13.3	60 16.6
4	0	19 1 38.80	19 15 59.1	60 18.0
	12	19 32 8.42	17 51 32.3	60 15.7
5	0	20 2 3.96	16 9 51.5	60 9.7
	12	20 31 20.62	14 13 18.4	60 0.4
6	0	20 59 56.09	12 4 28.8	59 47.3
	12	21 27 50.28	9 46 5.0	59 31.1
7	0	21 55 4.97	7 20 48.7	59 12.1
	12	22 21 43.31	4 51 16.4	58 50.6
8	0	22 47 49.45	S. 2 19 54.0	58 27.3
	12	23 13 28.12	N. 0 11 4.0	58 2.6
9	0	23 38 44.36	2 39 35.9	57 37.1
	12	0 3 43.26	5 3 54.4	57 11.4
10	0	0 28 29.68	7 22 24.2	56 46.0
	12	0 53 8.24	9 33 41.7	56 21.5
11	0	1 17 43.10	11 36 34.0	55 58.1
	12	1 42 17.88	13 29 56.7	55 36.6
12	0	2 6 55.59	15 12 53.8	55 17.2
	12	2 31 38.56	16 44 35.8	54 59.6
13	0	2 56 28.40	18 4 19.1	54 44.7
	12	3 21 25.96	19 11 26.2	54 32.2
14	0	3 46 31.31	20 5 24.4	54 22.5
	12	4 11 43.79	20 45 47.2	54 15.2
15	0	4 37 2.13	21 12 13.4	54 10.5
	12	5 2 24.51	21 24 28.6	54 8.6
16	0	5 27 48.70	21 22 25.2	54 9.1
	12	5 53 12.30	21 6 3.3	54 12.0
17	0	6 18 32.86	20 35 30.4	54 16.9
	12	6 43 48.15	19 51 2.1	54 24.1
18	0	7 8 56.23	18 53 2.5	54 33.0
	12	7 33 53.73	17 42 3.0	54 43.6
19	0	7 58 45.88	16 18 44.7	54 55.6
	12	8 23 26.59	14 43 54.4	55 8.6
20	0	8 47 58.51	12 58 27.7	55 23.0
	12	9 12 23.00	11 3 27.1	55 37.8
21	0	9 36 42.12	9 0 2.1	55 53.1
	12	10 0 58.58	6 49 28.5	56 8.9
22	0	10 25 15.66	4 33 8.9	56 25.1
	12	10 49 37.14	N. 2 12 32.1	56 40.8
23	0	11 14 7.18	S. 0 10 47.1	56 56.5
	12	11 38 50.24	2 35 8.2	57 11.6
24	0	12 3 50.93	4 58 44.7	57 26.2
	12	12 29 13.80	7 19 45.7	57 40.2
25	0	12 55 3.26	9 36 15.1	57 53.6
	12	13 21 23.21	11 46 13.0	58 6.0
26	0	13 48 16.87	13 47 37.3	58 17.7
	12	14 15 46.44	15 38 24.9	58 28.6
27	0	14 43 52.71	17 16 34.2	58 38.7
	12	15 12 34.88	18 40 9.4	58 48.0
28	0	15 41 50.28	19 47 22.9	58 56.4
	12	16 11 34.28	S. 20 36 41.5	59 4.0

Log. 12h. ar. comp. 5.36462.

Moon's Semidiameter = 0.2725 × ( )'s Hor. Par.) = [9.43537] Hor. Par.

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1845.] **MARCH.**

Greenwich Mean Time.	MOON'S Right Ascension.	Declination.	Hor. Par.
d. h.	h. m. s.	° ′ ″	′ ″
1 0	16 41 40.40	S. 21 6 50.9	59 10.7
12	17 12 0.68	21 16 59.7	59 16.2
2 0	17 42 26.16	21 6 43.2	59 20.6
12	18 12 47.60	20 36 6.6	59 23.9
3 0	18 42 59.22	19 45 44.4	59 25.4
12	19 12 44.27	18 36 38.2	59 25.5
4 0	19 42 5.68	17 10 15.1	59 23.6
12	20 10 56.19	15 28 22.0	59 19.7
5 0	20 39 13.48	13 33 1.2	59 13.6
12	21 6 57.05	11 26 25.5	59 5.2
6 0	21 34 7.95	9 10 53.1	58 54.6
12	22 0 48.50	6 48 43.8	58 41.7
7 0	22 27 1.93	4 22 16.2	58 26.8
12	22 52 52.06	S. 1 53 44.3	58 10.0
8 0	23 18 23.10	N. 0 34 41.4	57 51.8
12	23 43 39.29	3 1 10.5	57 32.5
9 0	0 8 44.81	5 23 42.5	57 12.1
12	0 33 43.58	7 40 38.9	56 51.3
10 0	0 58 39.11	9 50 27.8	56 30.5
12	1 23 34.44	11 51 46.6	56 9.8
11 0	1 48 31.99	13 43 22.7	55 50.0
12	2 13 33.60	15 24 12.4	55 31.2
12 0	2 38 40.36	16 53 20.6	55 13.7
12	3 3 52.71	18 10 1.8	54 58.2
13 0	3 39 10.39	19 13 38.1	54 44.6
12	3 54 32.55	20 3 40.3	54 33.0
14 0	4 19 57.78	20 39 46.8	54 24.1
12	4 45 24.28	21 1 44.5	54 17.6
15 0	5 10 49.98	21 9 27.2	54 13.5
12	5 36 12.75	21 2 56.6	54 12.3
16 0	6 1 30.54	20 42 21.2	54 13.4
12	6 26 41.58	20 7 56.6	54 17.5
17 0	6 51 44.48	19 20 3.9	54 24.2
12	7 16 38.39	18 19 10.8	54 33.0
18 0	7 41 23.09	17 5 50.3	54 44.2
12	8 5 58.99	15 40 41.5	54 57.6
19 0	8 30 27.19	14 4 28.1	55 12.6
12	8 54 49.43	12 18 0.3	55 29.4
20 0	9 19 8.10	10 22 13.5	55 47.6
12	9 43 26.15	8 18 10.8	56 6.7
21 0	10 7 47.02	6 7 2.3	56 26.5
12	10 32 14.59	3 50 5.8	56 46.6
22 0	10 56 53.08	N. 1 28 48.3	57 6.7
12	11 21 46.94	S. 0 55 14.3	57 26.5
23 0	11 47 0.71	3 20 16.4	57 45.3
12	12 12 38.83	5 44 23.1	58 3.2
24 0	12 38 45.52	8 5 30.5	58 19.9
12	13 5 24.42	10 21 27.6	58 34.8
25 0	13 32 38.36	12 29 58.2	58 47.8
12	14 0 29.03	14 28 43.3	58 58.8
26 0	14 28 56.62	16 15 26.5	59 7.8
12	14 57 59.56	17 47 55.9	59 14.5
27 0	15 27 34.30	19 4 13.4	59 19.1
12	15 57 35.31	20 2 37.5	59 22.0
28 0	16 27 55.25	20 41 49.1	59 23.0
12	16 58 25.37	21 0 57.0	59 22.3
29 0	17 28 56.17	20 59 40.2	59 20.0
12	17 59 18.15	20 38 7.3	59 16.4
30 0	18 29 22.54	19 56 56.9	59 11.6
12	18 59 1.93	18 57 14.0	59 5.5
31 0	19 28 10.77	17 40 24.2	58 58.8
12	19 56 45.46	S. 16 8 9.9	58 51.1

APRIL.

Greenwich Mean Time	MOON'S Right Ascension.	Declination.	Hor. Par.
d. h.	h. m. s.	° ′ ″	′ ″
1 0	20 24 44.49	S. 14 22 24.6	58 42.4
12	20 52 8.09	12 25 9.1	58 33.0
2 0	21 18 58.04	10 18 25.8	58 22.7
12	21 45 17.34	8 4 19.5	58 11.4
3 0	22 11 9.78	5 44 51.3	57 59.3
12	22 36 39.75	3 22 0.8	57 46.1
4 0	23 1 51.87	S. 0 57 43.2	57 32.3
12	23 26 50.83	N. 1 26 10.3	57 17.6
5 0	23 51 41.16	3 47 53.2	57 2.3
12	0 16 27.07	6 5 44.3	56 46.5
6 0	0 41 12.34	8 18 7.4	56 30.2
12	1 6 0.15	10 23 33.0	56 13.8
7 0	1 30 53.02	12 20 37.4	55 57.6
12	1 55 52.76	14 8 4.6	55 41.5
8 0	2 21 0.32	15 44 46.4	55 26.2
12	2 46 15.87	17 9 43.0	55 11.5
9 0	3 11 38.78	18 22 4.2	54 57.8
12	3 37 7.64	19 21 9.6	54 45.3
10 0	4 2 40.47	20 6 29.0	54 34.4
12	4 28 14.76	20 37 42.2	54 25.3
11 0	4 53 47.75	20 54 39.3	54 18.0
12	5 19 16.63	20 57 19.6	54 12.9
12 0	5 44 38.72	20 45 52.2	54 10.3
12	6 9 51.67	20 20 33.3	54 9.9
13 0	6 34 53.72	19 41 46.6	54 12.0
12	6 59 43.74	18 50 1.0	54 16.5
14 0	7 24 21.34	17 45 50.8	54 23.9
12	7 48 46.95	16 29 53.9	54 33.9
15 0	8 13 1.78	15 2 51.5	54 46.3
12	8 37 7.83	13 25 28.4	55 1.1
16 0	9 1 7.78	11 38 32.7	55 18.3
12	9 25 5.02	9 42 55.7	55 37.5
17 0	9 49 3.44	7 39 33.6	55 58.7
12	10 13 7.51	5 29 29.1	56 21.1
18 0	10 37 22.09	3 13 51.2	56 44.8
12	11 1 52.33	N. 0 53 58.2	57 9.3
19 0	11 26 43.59	S. 1 28 41.4	57 33.9
12	11 52 1.29	3 52 27.7	57 58.3
20 0	12 17 50.64	6 15 27.9	58 22.0
12	12 44 1[illegible].47	8 35 36.5	58 44.6
21 0	13 11 22.87	10 50 36.7	59 5.3
12	13 39 12.78	12 58 0.7	59 23.8
22 0	14 7 47.55	14 55 14.0	59 39.7
12	14 37 6.55	16 39 42.8	59 52.8
23 0	15 7 6.73	18 8 58.4	60 2.5
12	15 37 42.43	19 20 46.3	60 9.0
24 0	16 8 45.49	20 13 15.1	60 11.8
12	16 40 5.59	20 45 4.2	60 11.5
25 0	17 11 30.95	20 55 29.1	60 7.8
12	17 42 49.41	20 44 24.9	60 1.4
26 0	18 13 49.42	20 12 24.6	59 52.7
12	18 44 21.02	19 20 35.7	59 41.2
27 0	19 14 16.48	18 10 33.2	59 28.1
12	19 43 30.71	16 44 11.6	59 13.7
28 0	20 12 1.24	15 3 37.3	58 58.3
12	20 39 47.98	13 11 2.4	58 42.0
29 0	21 6 52.80	11 8 38.8	58 25.5
12	21 33 19.14	8 58 34.4	58 8.6
30 0	21 59 11.51	6 42 51.7	57 51.7
12	22 24 35.09	S. 4 23 26.2	57 35.1

Log. 12h. ar. comp. 5.36452.

Moon's Semidiameter = 0.2725 × ( )'s Hor. Par.) = [9.43537] Hor. Par.

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Greenwich Mean Time.	MOON'S Right Ascension.	Declination.	Hor. Par.
d. h.	h. m. s.	° ′ ″	′ ″
1 0	22 49 35.49	S. 2 2 7.8	57 18.7
12	23 14 18.31	N. 0 19 21.8	57 2.2
2 0	23 38 49.13	2 39 24.8	56 46.6
12	0 3 13.14	4 56 29.7	56 30.9
3 0	0 27 35.12	7 9 7.8	56 15.7
12	0 51 59.29	9 15 55.3	56 0.9
4 0	1 16 29.13	11 15 31.8	55 46.4
12	1 41 7.33	13 6 41.2	55 32.7
5 0	2 5 55.74	14 48 12.6	55 19.4
12	2 30 55.20	16 18 59.7	55 6.9
6 0	2 56 5.60	17 38 3.8	54 55.1
12	3 21 25.86	18 44 34.5	54 44.2
7 0	3 46 54.03	19 37 30.0	54 34.0
12	4 12 27.40	20 17 19.3	54 25.1
8 0	4 38 2.71	20 42 41.7	54 17.6
12	5 3 36.37	20 53 48.9	54 11.2
9 0	5 29 4.80	20 50 42.6	54 6.5
12	5 54 24.62	20 33 35.5	54 3.6
10 0	6 19 32.95	20 2 49.2	54 2.7
12	6 44 27.56	19 18 53.7	54 3.4
11 0	7 9 7.08	18 22 25.0	54 6.6
12	7 33 31.03	17 14 4.1	54 11.9
12 0	7 57 39.92	15 54 35.5	54 19.5
12	8 21 35.12	14 24 46.1	54 29.6
13 0	8 45 18.95	12 45 24.4	54 42.2
12	9 8 54.49	10 57 21.2	54 57.2
14 0	9 32 25.54	9 1 28.8	55 14.7
12	9 55 56.61	6 58 41.5	55 34.5
15 0	10 19 32.68	4 49 57.8	55 56.3
12	10 43 19.27	2 36 20.7	56 20.2
16 0	11 7 22.28	N. 0 19 0.3	56 45.8
12	11 31 47.86	S. 2 0 44.9	57 12.5
17 0	11 56 42.31	4 21 25.8	57 40.2
12	12 22 11.85	6 41 20.4	58 8.2
18 0	12 48 22.42	8 58 32.7	58 35.9
12	13 15 19.23	11 10 52.7	59 2.8
19 0	13 43 6.39	13 15 56.2	59 28.2
12	14 11 46.37	15 11 9.5	59 51.4
20 0	14 41 19.37	16 53 44.0	60 12.1
12	15 11 42.82	18 21 4.9	60 29.3
21 0	15 42 50.96	19 30 39.3	60 42.8
12	16 14 34.79	20 20 16.6	60 52.0
22 0	16 46 42.45	20 48 19.8	60 57.1
12	17 19 0.03	20 53 52.6	60 57.5
23 0	17 51 12.76	20 36 45.6	60 53.7
12	18 23 6.48	19 57 36.4	60 45.9
24 0	18 54 28.86	18 57 45.3	60 34.1
12	19 25 10.35	17 39 6.8	60 19.0
25 0	19 55 4.61	16 3 59.8	60 1.0
12	20 24 8.57	14 14 55.5	59 40.9
26 0	20 52 22.04	12 14 28.6	59 19.0
12	21 19 47.23	10 5 11.3	58 56.2
27 0	21 46 28.12	7 49 27.3	58 32.5
12	22 12 29.87	5 29 28.8	58 8.9
28 0	22 37 58.40	3 7 17.4	57 45.6
12	23 3 0.01	S. 0 44 42.7	57 23.0
29 0	23 27 40.96	N. 1 36 35.1	57 0.9
12	23 52 7.41	3 55 5.7	56 40.0
30 0	0 16 25.11	6 9 25.4	56 20.5
12	0 40 39.38	8 18 14.8	56 2.1
31 0	1 4 54.81	10 20 21.8	55 44.9
12	1 29 15.33	N. 12 14 36.6	55 29.1

Greenwich Mean Time	MOON'S Right Ascension.	Declination.	Hor. Par.
d. h.	h. m. s.	° ′ ″	′ ″
1 0	1 53 44.05	N. 13 59 53.8	55 14.5
12	2 18 23.08	15 35 10.8	55 1.1
2 0	2 43 13.56	16 59 30.3	54 48.9
12	3 8 15.60	18 11 59.5	54 38.2
3 0	3 33 28.26	19 11 52.7	54 28.4
12	3 58 49.67	19 58 31.9	54 20.6
4 0	4 24 17.07	20 31 28.2	54 12.7
12	4 49 47.08	20 50 22.6	54 6.8
5 0	5 15 15.93	20 55 7.9	54 2.0
12	5 40 39.74	20 45 47.4	53 58.6
6 0	6 5 51.81	20 22 36.2	53 56.4
12	6 30 57.91	19 45 58.1	53 55.8
7 0	6 55 46.48	18 56 26.5	53 56.8
12	7 20 18.78	17 54 42.1	53 59.5
8 0	7 44 34.08	16 41 30.9	54 3.8
12	8 8 32.60	15 17 43.3	54 9.6
9 0	8 32 15.54	13 44 11.9	54 17.6
12	8 55 45.03	12 1 51.4	54 27.7
10 0	9 19 4.05	10 11 37.1	54 39.7
12	9 42 10.35	8 14 25.9	54 53.9
11 0	10 5 26.37	6 11 15.6	55 10.5
12	10 28 39.12	4 3 5.4	55 28.9
12 0	10 52 0.14	N. 1 50 58.0	55 49.6
12	11 15 35.43	S. 0 23 59.7	56 12.4
13 0	11 39 31.30	2 40 34.3	56 37.1
12	12 3 54.29	4 57 24.7	57 3.3
14 0	12 28 51.04	7 12 59.4	57 30.7
12	12 54 27.98	9 25 35.4	57 59.0
15 0	13 20 51.09	11 33 16.4	58 27.8
12	13 48 5.51	13 33 51.4	58 56.4
16 0	14 16 14.92	15 24 58.0	59 24.3
12	14 45 21.07	17 4 3.6	59 50.5
17 0	15 15 23.03	18 28 31.0	60 14.6
12	15 46 16.75	19 35 47.1	60 35.8
18 0	16 17 54.71	20 23 33.0	60 53.4
12	16 50 6.07	20 49 56.4	61 7.1
19 0	17 22 37.27	20 53 42.1	61 16.1
12	17 55 13.12	20 34 21.7	61 20.6
20 0	18 27 38.26	19 52 16.3	61 20.1
12	18 59 38.61	18 48 36.9	61 14.5
21 0	19 31 2.59	17 25 15.9	61 4.4
12	20 1 41.85	15 44 37.9	60 50.1
22 0	20 31 31.45	13 49 27.5	60 31.8
12	21 0 20.77	11 42 37.4	60 10.2
23 0	21 28 37.87	9 26 59.3	59 46.1
12	21 55 58.98	7 5 16.4	59 19.9
24 0	22 22 37.81	4 39 59.8	58 52.8
12	22 48 40.03	S. 2 13 25.1	58 24.9
25 0	23 14 11.79	N. 0 12 27.1	57 57.0
12	23 39 19.36	2 35 49.2	57 29.6
26 0	0 4 8.93	4 55 7.1	57 3.3
12	0 28 46.31	7 8 57.8	56 38.2
27 0	0 53 16.87	9 16 5.8	56 14.8
12	1 17 45.33	11 15 24.0	55 53.0
28 0	1 42 15.72	13 5 50.0	55 33.2
12	2 6 51.27	14 46 27.5	55 15.1
29 0	2 31 34.29	16 16 23.4	54 59.1
12	2 56 26.17	17 34 50.2	54 45.0
30 0	3 21 27.27	18 41 5.1	54 33.0
12	3 46 37.01	N. 19 34 30.5	54 22.6

Log. 12h. ar. comp. 5.36452.

Moon's Semidiameter = 0.2725 × ( )'s Hor. Par.) = [9.43537] Hor. Par.

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Greenwich Mean Time.		MOON'S Right Ascension.			Declination.			Hor. Par.	
d.	h.	h.	m.	s.	°	′	″	′	″
1	0	4	11	53.90	N. 20	14	35.9	54	13.8
	12	4	37	15.60	20	40	58.7	54	6.8
2	0	5	2	39.18	20	53	25.0	54	1.4
	12	5	28	1.28	20	51	50.7	53	57.6
3	0	5	53	18.39	20	36	21.5	53	55.2
	12	6	18	27.10	20	7	14.1	53	54.1
4	0	6	43	24.41	19	24	53.5	53	54.5
	12	7	8	7.83	18	29	54.7	53	56.3
5	0	7	32	35.69	17	22	59.6	53	59.3
	12	7	56	47.13	16	4	56.4	54	3.8
6	0	8	20	42.21	14	34	39.1	54	9.7
	12	8	44	21.89	12	59	4.1	54	17.1
7	0	9	7	48.01	11	13	10.6	54	25.7
	12	9	31	3.22	9	20	0.1	54	35.8
8	0	9	54	10.88	7	20	34.8	54	47.5
	12	10	17	15.06	5	15	58.2	55	0.8
9	0	10	40	20.33	3	7	15.3	55	15.7
	12	11	3	31.88	N. 0	55	33.1	55	32.2
10	0	11	26	55.20	S. 1	17	55.4	55	50.7
	12	11	50	36.19	3	32	5.3	56	10.5
11	0	12	14	40.96	5	45	27.5	56	31.8
	12	12	39	15.73	7	56	37.7	56	55.0
12	0	13	4	26.56	10	4	1.0	57	19.2
	12	13	30	19.24	12	5	51.7	57	44.5
13	0	13	56	58.83	14	0	13.8	58	10.6
	12	14	24	29.26	15	45	1.6	58	36.9
14	0	14	52	52.89	17	18	1.4	59	3.1
	12	15	22	9.89	18	36	54.5	59	28.6
15	0	15	52	17.82	19	39	23.6	59	52.6
	12	16	23	11.25	20	23	21.4	60	14.8
16	0	16	54	41.72	20	46	59.1	60	34.3
	12	17	26	38.10	20	48	57.1	60	50.4
17	0	17	58	47.38	20	28	34.0	61	2.6
	12	18	30	55.76	19	45	52.4	61	10.7
18	0	19	2	49.93	18	41	41.9	61	14.0
	12	19	34	18.22	17	17	33.8	61	12.9
19	0	20	5	11.49	15	35	37.1	61	6.7
	12	20	35	23.56	13	38	26.9	60	55.9
20	0	21	4	51.20	11	28	55.2	60	41.1
	12	21	33	33.86	9	9	59.0	60	22.1
21	0	22	1	33.25	6	44	32.8	60	0.6
	12	22	28	52.68	4	15	22.7	59	35.3
22	0	22	55	36.63	S. 1	45	1.2	59	8.3
	12	23	21	50.25	N. 0	44	15.0	58	40.2
23	0	23	47	38.97	3	10	24.3	58	11.4
	12	0	13	8.23	5	31	40.7	57	42.7
24	0	0	38	23.24	7	46	32.1	57	14.4
	12	1	3	28.78	9	53	38.9	56	47.1
25	0	1	28	29.10	11	54	51.7	56	21.5
	12	1	53	27.81	13	40	9.8	55	57.4
26	0	2	18	27.74	15	17	41.2	55	35.5
	12	2	43	31.00	16	43	39.6	55	15.7
27	0	3	8	38.76	17	57	25.1	54	58.1
	12	3	33	51.41	18	58	24.3	54	43.0
28	0	3	59	8.50	19	46	10.0	54	30.2
	12	4	24	28.82	20	20	21.4	54	19.6
29	0	4	49	50.54	20	40	44.1	54	11.4
	12	5	15	11.34	20	47	12.6	54	5.4
30	0	5	40	28.58	20	39	49.1	54	1.2
	12	6	5	39.57	20	18	43.5	53	59.0
31	0	6	30	41.74	19	44	15.0	53	58.7
	12	6	55	32.82	N. 18	56	50.9	53	59.8

Greenwich Mean Time		MOON'S Right Ascension.			Declination.			Hor. Par.	
d.	h.	h.	m.	s.	°	′	″	′	″
1	0	7	20	11.03	N. 17	57	5.1	54	2.8
	12	7	44	35.23	16	45	40.2	54	6.9
2	0	8	8	44.98	15	23	23.5	54	12.6
	12	8	32	40.56	13	51	8.5	54	19.6
3	0	8	56	22.99	12	9	52.7	54	27.7
	12	9	19	54.08	10	20	37.4	54	37.0
4	0	9	43	16.25	8	24	27.5	54	47.2
	12	10	6	32.58	6	22	29.4	54	58.2
5	0	10	29	46.68	4	15	52.9	55	10.4
	12	10	53	2.67	N. 2	5	49.7	55	23.7
6	0	11	16	25.05	S. 0	6	25.9	55	37.7
	12	11	39	58.71	2	19	36.3	55	52.7
7	0	12	3	48.74	4	32	21.2	56	8.7
	12	12	28	0.42	6	43	14.8	56	25.2
8	0	12	52	39.01	8	50	47.4	56	43.0
	12	13	17	49.56	10	53	23.6	57	1.5
9	0	13	43	36.77	12	49	21.3	57	20.6
	12	14	10	4.67	14	36	52.6	57	40.7
10	0	14	37	16.20	16	14	4.5	58	1.3
	12	15	5	12.97	17	39	0.6	58	22.0
11	0	15	33	54.82	18	49	43.6	58	42.8
	12	16	3	19.48	19	44	20.3	59	3.2
12	0	16	33	22.43	20	21	8.0	59	22.9
	12	17	3	56.86	20	38	39.9	59	41.1
13	0	17	34	54.06	20	35	52.8	59	58.1
	12	18	6	3.88	20	12	12.6	60	12.7
14	0	18	37	15.62	19	27	42.0	60	24.7
	12	19	8	18.83	18	22	57.9	60	33.2
15	0	19	39	4.20	16	59	14.4	60	38.2
	12	20	9	24.21	15	18	17.7	60	39.6
16	0	20	39	13.49	13	22	19.5	60	36.8
	12	21	8	28.90	11	13	51.4	60	30.1
17	0	21	37	9.44	8	55	35.6	60	19.5
	12	22	5	15.89	6	30	18.8	60	5.3
18	0	22	32	50.50	4	0	45.7	59	47.5
	12	22	59	56.48	S. 1	29	33.5	59	26.7
19	0	23	26	37.69	N. 1	0	51.4	59	3.6
	12	23	52	58.33	3	28	15.2	58	38.7
20	0	0	19	2.59	5	50	38.6	58	12.9
	12	0	44	54.51	8	6	16.6	57	46.1
21	0	1	10	37.72	10	13	38.9	57	19.4
	12	1	36	15.40	12	11	24.6	56	53.2
22	0	2	1	50.11	13	58	30.4	56	27.8
	12	2	27	23.75	15	34	0.5	56	3.8
23	0	2	52	57.52	16	57	9.7	55	41.6
	12	3	18	31.87	18	7	21.9	55	21.4
24	0	3	44	6.64	19	4	9.4	55	3.3
	12	4	9	41.00	19	47	13.5	54	47.7
25	0	4	35	13.65	20	16	22.3	54	34.5
	12	5	0	42.89	20	31	31.8	54	23.9
26	0	5	26	6.77	20	32	45.0	54	15.9
	12	5	51	23.30	20	20	12.5	54	10.3
27	0	6	16	30.62	19	54	11.7	54	7.2
	12	6	41	27.08	19	15	6.1	54	6.3
28	0	7	6	11.46	18	23	25.7	54	7.6
	12	7	30	43.02	17	19	46.4	54	11.1
29	0	7	55	1.61	16	4	48.8	54	16.6
	12	8	19	7.63	14	39	19.5	54	23.7
30	0	8	43	2.11	13	4	8.8	54	32.4
	12	9	6	46.71	11	20	12.2	54	42.3
31	0	9	30	23.60	9	28	28.8	54	53.7
	12	9	53	55.46	N. 7	30	2.8	55	5.9

Log. 12h. ar. comp. 5.36452.

Moon's Semidiameter = 0.2725 × ( )'s Hor. Par.) = [9.43537] Hor. Par.

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1845.] SEPTEMBER.

Greenwich Mean Time.	MOON'S Right Ascension.	Declination.	Hor. Par.
d. h.	h. m. s.	° ′ ″	′ ″
1 0	10 17 25.49	N. 5 26 2.3	55 19.1
12	10 40 57.20	3 17 39.3	55 32.7
2 0	11 4 34.49	N. 1 6 10.8	55 46.9
12	11 28 21.49	S. 1 7 2 2	56 1.4
3 0	11 52 22.55	3 20 33.5	56 16.2
12	12 16 42.05	5 32 53.0	56 31.0
4 0	12 41 24.34	7 42 25.4	56 45.9
12	13 6 33.57	9 47 31.6	57 0.9
5 0	13 32 13 53	11 46 27.0	57 15 7
12	13 58 27.37	13 37 26.1	57 30.1
6 0	14 25 17.38	15 18 39.8	57 44.6
12	14 52 44.71	16 48 19.0	57 58.7
7 0	15 20 49.14	18 4 37.6	58 12.5
12	15 49 28 85	19 5 54.7	58 26.2
8 0	16 18 40.27	19 50 39.7	58 39.4
12	16 48 18 20	20 17 36 0	58 52.2
9 0	17 18 15 94	20 25 46.1	59 4.2
12	17 48 25.78	20 14 35.8	59 15.3
10 0	18 18 39 46	19 43 55.9	59 25.3
12	18 48 48.86	18 54 5.6	59 34.0
11 0	19 18 46.56	17 45 51.7	59 40.9
12	19 48 26.38	16 20 26.4	59 45.8
12 0	20 17 43.68	14 39 25.2	59 48.5
12	20 46 35.53	12 44 43.0	59 48.6
13 0	21 15 0.66	10 38 29.5	59 46.1
12	21 42 59.31	8 23 2.9	59 40.7
14 0	22 10 32.94	6 0 49.6	59 32.3
12	22 37 43.99	3 34 15 4	59 21.2
15 0	23 4 35.50	S. 1 5 45.4	59 7.6
12	23 31 10.89	N. 1 22 20.3	58 51.5
16 0	23 57 33.63	3 47 48.9	58 33.2
12	0 23 47.10	6 8 37.7	58 13.1
17 0	0 49 54.34	8 22 54.2	57 51.7
12	1 15 57.91	10 28 57.3	57 29.5
18 0	1 41 59.80	12 25 19.3	57 6.8
12	2 8 1.30	14 10 44.4	56 44.2
19 0	2 34 3.03	15 44 9.8	56 22.0
12	3 0 4.90	17 4 45.3	56 0.6
20 0	3 26 6.13	18 11 52.5	55 40.2
12	3 52 5 41	19 5 4 8	55 21.6
21 0	4 18 0.97	19 44 6.1	55 4.9
12	4 43 50.75	20 8 51 1	54 50.0
22 0	5 9 32.59	20 19 23.1	54 37.6
12	5 35 4.39	20 15 54.2	54 27.4
23 0	6 0 24.26	19 58 43.6	54 19.8
12	6 25 30 75	19 28 16.5	54 14.9
24 0	6 50 22.84	18 45 4.1	54 12 6
12	7 15 0.15	17 49 41.1	54 12.9
25 0	7 39 22.88	16 42 46.7	54 15.7
12	8 3 31.88	15 25 3.2	54 21.1
26 0	8 27 28.63	13 57 15.6	54 28.6
12	8 51 15.19	12 20 12 5	54 38.3
27 0	9 14 54.11	10 34 44.9	54 49.9
12	9 38 28.46	8 41 48.4	55 3.4
28 0	10 2 1.72	6 42 22.1	55 18.3
12	10 25 37.68	4 37 30.3	55 34.6
29 0	10 49 20.41	2 28 22 8	55 51.7
12	11 13 14.19	N. 0 16 16.1	56 9.4
30 0	11 37 23.40	S. 1 57 26.2	56 27.4
12	12 1 52.41	S. 4 11 13.9	56 45.5

OCTOBER.

Greenwich Mean Time	MOON'S Right Ascension.	Declination.	Hor. Par.
d. h.	h. m. s.	° ′ ″	′ ″
1 0	12 26 45.46	S. 6 23 28.8	57 3.1
12	12 52 6.51	8 32 25.4	57 20.4
2 0	13 17 59.00	10 36 12 8	57 36.7
12	13 44 25.68	12 32 54.3	57 51.9
3 0	14 11 28.30	14 20 30.9	58 6.1
12	14 39 7.36	15 57 4.1	58 19.0
4 0	15 7 21.87	17 20 38.5	58 30.3
12	15 36 9.23	18 29 27.3	58 40.2
5 0	16 5 25.05	19 21 56.5	58 48.8
12	16 35 3.44	19 56 49.1	58 55.8
6 0	17 4 57.16	20 13 10.0	59 1.5
12	17 34 38.17	20 10 28.5	59 5.9
7 0	18 4 58.18	19 48 40.8	59 9.1
12	18 34 49.31	19 8 8.6	59 11.4
8 0	19 4 24.68	18 9 39.4	59 12.5
12	19 33 38.75	16 54 22.3	59 12.4
9 0	20 2 27.73	15 23 44.5	59 11.1
12	20 30 49.52	13 39 27.9	59 8.7
10 0	20 58 43.69	11 43 25.3	59 5.1
12	21 26 11.25	9 37 36.1	59 0.2
11 0	21 53 14.42	7 24 3.9	58 53.8
12	22 19 56.26	5 4 55.3	58 45.9
12 0	22 46 20.44	2 42 16.4	58 36.6
12	23 12 30.91	S. 0 18 11.7	58 25.7
13 0	23 38 31.68	N. 2 5 15.9	58 13.3
12	0 4 26.62	4 26 8.3	57 59.5
14 0	0 30 19.20	6 42 31.6	57 44.5
12	0 56 12.38	8 52 39.3	57 28.3
15 0	1 22 8.43	10 54 50.8	57 11.4
12	1 48 8.84	12 47 36.2	56 53.7
16 0	2 14 14.24	14 29 34.4	56 35.6
12	2 40 24.35	15 59 36.4	56 17.6
17 0	3 6 38.05	17 16 45.4	55 59.7
12	3 32 53.42	18 20 17.3	55 42.3
18 0	3 59 7.93	19 9 41.6	55 25.8
12	4 25 18.57	19 44 40.9	55 10.3
19 0	4 51 22.17	20 5 10.7	54 56.3
12	5 17 15.55	20 11 17.6	54 43.8
20 0	5 42 55.85	20 3 18.8	54 33.0
12	6 8 20.66	19 41 40.6	54 24.5
21 0	6 33 28 25	19 6 55.6	54 18.0
12	6 58 17.61	18 19 42.1	54 14.0
22 0	7 22 48.57	17 20 42.2	54 12.5
12	7 47 1.77	16 10 40.3	54 13.4
23 0	8 10 58.66	14 50 22.9	54 17.2
12	8 34 41.41	13 20 37.6	54 23.5
24 0	8 58 12.85	11 42 12.8	54 32.5
12	9 21 36.40	9 55 58.3	54 43.8
25 0	9 44 55.99	8 2 45.2	54 57.5
12	10 8 15.99	6 3 28.7	55 13.5
26 0	10 31 41.09	3 59 6 3	55 31.6
12	10 55 16.31	N. 1 50 41.7	55 51.3
27 0	11 19 6.75	S. 0 20 35.4	56 12.5
12	11 43 17.68	2 33 26 5	56 34.7
28 0	12 7 54.25	4 46 24.7	56 57.4
12	12 33 1.45	6 57 52.3	57 20.3
29 0	12 58 43.77	9 6 1.2	57 42.7
12	13 25 5.04	11 8 53.7	58 4.6
30 0	13 52 8.04	13 4 23.0	58 25.0
12	14 19 54.19	14 50 16.8	58 43.9
31 0	14 48 23 16	16 24 20.7	59 0.6
12	15 17 32 54	S. 17 44 25 5	59 15.1

Log. 12h. ar. comp. 5.36452.

Moon's Semidiameter = 0.2725 × ( )'s Hor. Par.) = [9.43537] Hor. Par.

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Greenwich Mean Time.	MOON'S Right Ascension.			Declination.			Hor. Par.	
d. h	h.	m.	s.	°	′	″	′	″
1 0	15	47	17.76	S. 18	48	31.1	59	26.7
12	16	17	32.03	19	34	55.6	59	35.8
2 0	16	48	6.64	20	2	21.5	59	41.9
12	17	18	51.59	20	10	0.7	59	45.4
3 0	17	49	36.27	19	57	38.7	59	46.0
12	18	20	10.40	19	25	34.2	59	44.1
4 0	18	50	24.86	18	34	37.1	59	39.8
12	19	20	12.26	17	26	4.0	59	33.9
5 0	19	49	27.43	16	1	32.7	59	25.9
12	20	18	7.49	14	22	55.5	59	16.7
6 0	20	46	11.67	12	32	12.7	59	6.6
12	21	13	41.11	10	31	29.3	58	55.4
7 0	21	40	38.49	8	22	50.0	58	43.4
12	22	7	7.57	6	8	17.1	58	30.9
8 0	22	33	12.88	3	49	49.3	58	18.0
12	22	58	59.40	1	29	21.3	58	4.7
9 0	23	24	32.22	N. 0	51	17.0	57	50.9
12	23	49	56.35	3	10	20.0	57	36.9
10 0	0	15	16.49	5	26	5.7	57	22.8
12	0	40	36.86	7	36	56.4	57	8.4
11 0	1	6	1.01	9	41	19.1	56	53.7
12	1	31	31.69	11	37	45.2	56	39.1
12 0	1	57	10.72	13	24	51.8	56	24.3
12	2	22	58.95	15	1	23.0	56	9.4
13 0	2	48	56.12	16	26	11.4	55	54.9
12	3	15	0.92	17	38	19.1	55	40.6
14 0	3	41	11.10	18	37	0.0	55	26.8
12	4	7	23.53	19	21	40.3	55	13.3
15 0	4	33	34.54	19	51	59.4	55	0.7
12	4	59	40.10	20	7	50.2	55	49.1
16 0	5	25	36.17	20	9	19.0	54	38.3
12	5	51	19.01	19	56	43.8	54	28.9
17 0	6	16	45.40	19	30	33.4	54	21.0
12	6	41	52.91	18	51	24.8	54	14.6
18 0	7	6	40.00	18	0	1.6	54	10.1
12	7	31	6.11	16	57	11.9	54	7.5
19 0	7	55	11.66	15	43	46.3	54	7.0
12	8	18	58.03	14	20	37.3	54	8.7
20 0	8	42	27.45	12	48	36.7	54	12.8
12	9	5	42.93	11	8	37.2	54	19.5
21 0	9	28	48.16	9	21	30.4	54	28.7
12	9	51	47.47	7	28	8.5	54	40.4
22 0	10	14	45.61	5	29	23.9	54	54.6
12	10	37	47.83	3	26	11.5	55	11.6
23 0	11	0	59.69	N. 1	19	28.8	55	30.7
12	11	24	27.03	S. 0	49	41.1	55	52.1
24 0	11	48	15.90	3	0	8.8	56	15.5
12	12	12	32.35	5	10	36.5	56	40.3
25 0	12	37	22.37	7	19	36.0	57	6.6
12	13	2	51.61	9	25	27.3	57	33.7
26 0	13	29	5.09	11	26	18.3	58	0.7
12	13	56	6.82	13	20	4.8	58	27.4
27 0	14	23	59.37	15	4	32.3	58	53.3
12	14	52	43.40	16	37	19.1	59	17.4
28 0	15	22	17.10	17	56	2.8	59	39.4
12	15	52	35.93	18	58	27.6	59	58.5
29 0	16	23	32.47	19	42	33.4	60	14.4
12	16	54	56.69	20	6	45.6	60	26.2
30 0	17	26	36.52	20	10	3.2	60	34.4
12	17	58	18.85	S. 19	52	6.1	60	38.4

Greenwich Mean Time	MOON'S Right Ascension.			Declination.			Hor. Par.	
d. h.	h.	m.	s.	°	′	″	′	″
1 0	18	29	50.74	S. 19	13	15.2	60	38.4
12	19	1	0.51	18	14	32.6	60	34.2
2 0	19	31	38.67	16	57	34.3	60	26.6
12	20	1	38.48	15	24	21.1	60	15.5
3 0	20	30	56.09	13	37	12.5	60	1.7
12	20	59	30.38	11	38	34.6	59	45.6
4 0	21	27	22.54	9	30	54.5	59	27.6
12	21	54	35.62	7	16	35.4	58	8.4
5 0	22	21	13.96	4	57	52.3	58	48.4
12	22	47	22.74	2	36	50.7	58	28.2
6 0	23	13	7.62	0	15	26.8	58	7.5
12	23	38	34.39	N. 2	4	32.7	57	47.3
7 0	0	3	48.71	4	21	29.8	57	27.6
12	0	28	55.89	6	33	52.5	57	8.5
8 0	0	54	0.73	8	40	17.3	56	50.0
12	1	19	7.39	10	39	23.8	56	32.6
9 0	1	44	19.22	12	29	57.7	56	16.0
12	2	9	38.61	14	10	50.1	56	0.1
10 0	2	35	6.98	15	40	56.4	55	45.0
12	3	0	44.65	16	59	19.3	55	30.9
11 0	3	26	30.84	18	5	9.0	55	17.8
12	3	52	23.75	18	57	43.6	55	5.3
12 0	4	18	20.63	19	36	32.7	54	54.0
12	4	44	18.03	20	1	16.8	54	43.5
13 0	5	10	12.02	20	11	48.1	54	34.0
12	5	35	58.49	20	8	11.4	54	25.3
14 0	6	1	33.49	19	50	44.1	54	17.8
12	6	26	53.46	19	19	53.7	54	11.7
15 0	6	51	55.55	18	36	17.3	54	6.5
12	7	16	37.71	17	40	40.3	54	2.7
16 0	7	40	58.87	16	33	53.3	54	0.3
12	8	4	58.97	15	16	50.5	53	59.7
17 0	8	28	38.88	13	50	28.7	54	0.5
12	8	52	0.43	12	15	45.4	54	3.2
18 0	9	15	6.24	10	33	38.0	54	7.9
12	9	37	59.70	8	45	2.9	54	14.7
19 0	10	0	44.84	6	50	56.2	54	23.7
12	10	23	26.22	4	52	13.9	54	34.8
20 0	10	46	8.93	2	49	51.5	54	48.3
12	11	8	58.44	N. 0	44	46.3	55	4.1
21 0	11	32	0.56	S. 1	22	0.5	55	22.5
12	11	55	21.38	3	29	25.6	55	43.2
22 0	12	19	7.14	5	36	18.2	56	6.0
12	12	43	24.13	7	41	20.3	56	31.0
23 0	13	8	18.55	9	43	3.2	56	57.6
12	13	33	56.16	11	39	49.1	57	25.5
24 0	14	0	22.03	13	29	47.4	57	54.3
12	14	27	40.12	15	10	55.8	58	23.7
25 0	14	55	52.75	16	41	3.3	58	52.8
12	15	25	0.07	17	57	52.5	59	21.1
26 0	15	54	59.60	18	59	6.1	59	47.7
12	16	25	45.88	19	42	35.8	60	12.0
27 0	16	57	10.41	20	6	31.1	60	33.2
12	17	29	2.03	20	9	30.7	60	50.6
28 0	18	1	7.69	19	50	50.8	61	3.7
12	18	33	13.55	19	10	31.9	61	12.3
29 0	19	5	6.25	18	9	20.1	61	15.9
12	19	36	34.18	16	48	44.6	61	14.5
30 0	20	7	28.16	15	10	49.2	61	8.3
12	20	37	42.06	13	18	3.6	60	57.4
31 0	21	7	12.71	11	13	13.1	60	42.4
12	21	35	59.66	S. 8	59	7.5	60	23.9

Log. 12h. ar. comp. 5.36452.

Moon's Semidiameter = 0.2725 × ( )'s Hor. Par.) = [9.43537] Hor. Par.

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h.	JAN. 1. SUN E.		JAN. 2. SUN E.		JAN. 3. SUN E.		JAN. 4. SUN E.		JAN. 5. SUN E.		JAN. 10. SUN W.	
	° ′ ″		° ′ ″		° ′ ″		° ′ ″		° ′ ″		° ′ ″	
0	91 43 56	2867	79 9 54	2736	66 12 48	2607	52 52 57	2489	39 13 21	2401	30 37 43	2594
3	90 10 55	2850	77 34 2	2720	64 34 2	2591	51 11 28	2477	37 29 48	2394	32 16 46	2610
6	88 37 32	2835	75 57 49	2703	62 54 55	2575	49 29 42	2464	35 46 4	2387	33 55 27	2627
9	87 3 49	2818	74 21 13	2687	61 15 26	2560	47 47 38	2452	34 2 10	2380	35 33 46	2643
12	85 29 44	2802	72 44 16	2671	59 35 36	2546	46 5 17	2441	32 18 7	2376	37 11 43	2661
15	83 55 19	2785	71 6 57	2655	57 55 26	2531	44 22 40	2430	30 33 58	2372	38 49 16	2678
18	82 20 32	2769	69 29 16	2638	56 14 56	2517	42 39 48	2419	28 49 43	2369	40 26 25	2696
21	80 45 24	2753	67 51 13	2622	54 34 6	2503	40 56 41	2410	27 5 24	2369	42 3 10	2715

	JAN. 11. SUN W.		JAN. 12. SUN W.		JAN. 13. SUN W.		JAN. 14. SUN W.		JAN. 15. SUN W.		JAN. 16. SUN W.	
0	43 39 30	2734	56 14 50	2892	68 23 3	3049	80 6 22	3191	91 28 36	3308	102 34 27	3398
3	45 15 25	2753	57 47 19	2913	69 52 15	3067	81 32 42	3207	92 52 38	3321	103 56 46	3407
6	46 50 54	2772	59 19 22	2931	71 21 5	3087	82 58 43	3222	94 16 25	3333	105 18 55	3416
9	48 25 58	2792	60 51 1	2952	72 49 31	3104	84 24 26	3238	95 39 58	3345	106 40 54	3423
12	50 0 38	2812	62 22 14	2971	74 17 36	3122	85 49 50	3253	97 3 17	3357	108 2 44	3431
15	51 34 48	2832	63 53 3	2991	75 45 19	3140	87 14 57	3268	98 26 23	3368	109 24 26	3438
18	53 8 34	2852	65 23 27	3010	77 12 40	3157	88 39 46	3282	99 49 16	3379	110 46 0	3445
21	54 41 55	2872	66 53 27	3030	78 39 41	3173	90 4 19	3295	101 11 57	3388	112 7 26	3451

	JAN. 17. SUN W.		JAN. 18. SUN W.		JAN. 19. JUPITER W.		JAN. 20. JUPITER W.		JAN. 21. JUPITER W.		JAN. 22. JUPITER W.	
0	113 28 45	3456	124 16 10	3487	74 25 50	3164	86 2 22	3140	97 43 38	3103	109 31 47	3055
3	114 49 58	3462	125 36 49	3489	75 52 51	3162	87 29 43	3137	99 11 44	3096	111 0 52	3049
6	116 11 5	3467	126 57 26	3490	77 19 46	3160	88 57 8	3132	100 39 58	3092	112 30 4	3043
9	117 32 6	3471	128 18 1	3491	78 46 43	3158	90 24 39	3128	102 8 18	3086	113 59 24	3036
12	118 53 3	3475	129 38 35	3492	80 13 43	3154	91 52 15	3123	103 36 45	3080	115 28 52	3030
15	120 13 55	3479	130 59 8	3493	81 40 47	3151	93 19 57	3119	105 5 19	3074	116 58 28	3023
18	121 34 43	3481	132 19 40	3492	83 7 55	3148	94 47 44	3113	106 34 1	3068	118 28 12	3017
21	122 55 28	3484	133 40 13	3494	84 35 6	3144	96 15 38	3108	108 2 50	3061	119 58 4	3010

	JAN. 23. MARS E.		JAN. 24. MARS E.		JAN. 25. MARS E.		JAN. 26. VENUS E.		JAN. 27. SUN E.		JAN. 28. SUN E.	
0	119 34 10	3140	107 50 53	3076	95 56 57	3010	119 5 35	3165	134 16 18	3030	122 13 26	2945
3	118 6 49	3132	106 22 14	3068	94 26 56	3002	117 38 44	3155	132 46 43	3020	120 42 4	2935
6	116 39 18	3124	104 53 25	3060	92 56 45	2992	116 11 41	3146	131 16 55	3009	119 10 29	2924
9	115 11 38	3117	103 24 26	3052	91 26 22	2984	114 44 27	3137	129 46 53	2999	117 38 40	2913
12	113 43 49	3109	101 55 17	3043	89 55 50	2975	113 17 2	3128	128 16 30	2988	116 6 37	2902
15	112 15 50	3101	100 25 58	3035	88 25 6	2967	111 49 26	3118	126 46 11	2977	114 34 21	2891
18	110 47 41	3092	98 56 28	3026	86 54 12	2958	110 21 38	3109	125 15 29	2966	113 1 51	2880
21	109 19 22	3084	97 26 48	3018	85 23 6	2950	108 53 39	3099	123 44 34	2956	111 29 6	2870

	JAN. 29. SUN E.		JAN. 30. SUN E.		JAN. 31. SUN E.		FEB. 1. SUN E.		FEB. 2. SUN E.		FEB. 3. SUN E.	
0	109 56 8	2858	97 23 44	2769	84 35 40	2680	71 32 1	2597	58 14 16	2528	44 45 48	2487
3	108 22 55	2847	95 48 35	2757	82 58 33	2669	69 53 2	2587	56 33 41	2521	43 4 16	2485
6	106 49 28	2836	94 13 11	2747	81 21 11	2658	68 13 49	2577	54 52 57	2515	41 22 41	2483
9	105 15 47	2825	92 37 33	2735	79 43 35	2647	66 34 23	2569	53 12 4	2509	39 41 4	2482
12	103 41 52	2814	91 1 40	2724	78 5 44	2637	64 54 45	2560	51 31 3	2503	37 59 26	2482
15	102 7 42	2802	89 25 32	2713	76 27 39	2627	63 14 55	2551	49 49 54	2498	36 17 48	2484
18	100 33 17	2792	87 49 9	2702	74 49 21	2616	61 34 53	2543	48 8 38	2494	34 36 12	2486
21	98 58 38	2780	86 12 32	2691	73 10 48	2606	59 54 40	2535	46 27 16	2490	32 54 39	2490

	FEB. 4. SUN E.		FEB. 8. SUN W.		FEB. 9. SUN W.		FEB. 10. SUN W.		FEB. 11. SUN W.		FEB. 12. SUN W.	
0	31 13 12	2495	23 18 33	2816	35 45 45	2905	47 53 52	3037	59 39 59	3169	71 5 37	3288
3	29 31 51	2502	24 52 40	2823	37 17 57	2922	49 23 19	3053	61 6 45	3185	72 30 2	3301
6	27 50 40	2510	26 26 38	2831	38 49 48	2937	50 52 26	3070	62 33 12	3201	73 54 12	3314
9	26 9 41	2522	28 0 26	2840	40 21 20	2953	52 21 12	3087	63 59 20	3216	75 18 7	3326
12	24 28 58	2535	29 34 2	2852	41 52 32	2970	53 49 38	3104	65 25 10	3231	76 41 48	3339
15	22 48 34	2553	31 7 23	2864	43 23 23	2986	55 17 43	3120	66 50 43	3247	78 5 14	3350
18	21 8 35	2575	32 40 28	2877	44 53 53	3002	56 45 28	3137	68 15 57	3260	79 28 28	3362
21	19 29 6	2604	34 13 16	2892	46 24 3	3019	58 12 53	3153	69 40 55	3274	80 51 28	3372

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h.	FEB. 13. SUN W. ° ′ ″	P. L.	FEB. 14. SUN W. ° ′ ″	P. L.	FEB. 15. SUN W. ° ′ ″	P. L.	FEB. 16. SUN W. ° ′ ″	P. L.	FEB. 17. SUN W. ° ′ ″	P. L.	FEB. 18. JUPITER W. ° ′ ″	P. L.
0	82 14 16	3382	93 10 27	3447	103 39 4	3480	114 45 1	3480	125 22 49	3451	100 19 58	3086
3	83 36 53	3393	94 31 50	3453	105 19 51	3480	116 5 48	3477	126 54 8	3447	101 48 25	3078
6	84 59 18	3402	95 53 7	3458	106 40 37	3482	117 26 38	3475	128 15 32	3441	103 17 1	3069
9	86 21 32	3410	97 14 18	3463	108 1 21	[illegible]	118 47 30	3472	129 37 2	3436	104 45 48	3061
12	87 43 37	3419	98 35 23	3467	109 22 5	3483	120 8 26	3469	130 58 38	3430	106 14 45	3052
15	89 5 32	3427	99 56 24	3471	110 42 48	3483	121 29 25	3464	132 20 21	3423	107 43 53	3044
18	90 27 18	3434	101 17 21	3474	112 3 31	3482	122 50 29	3461	133 42 11	3417	109 13 11	3035
21	91 48 56	3440	102 38 14	3477	113 24 15	3480	124 11 37	3457	135 4 8	3411	110 42 40	3026

h.	FEB. 19. JUPITER W. ° ′ ″	P. L.	FEB. 20. ALDEBARAN W. ° ′ ″	P. L.	FEB. 21. MARS E. ° ′ ″	P. L.	FEB. 22. MARS E. ° ′ ″	P. L.	FEB. 23. MARS E. ° ′ ″	P. L.	FEB. 24. MARS E. ° ′ ″	P. L.
0	112 12 21	3017	62 57 14	2856	116 47 2	2974	104 34 43	2885	92 7 28	2805	79 26 51	2732
3	113 42 13	3008	64 30 30	2844	115 16 43	2962	103 2 5	2875	90 33 6	2795	77 50 54	2725
6	115 12 16	2998	66 44 1	2834	113 45 42	2950	101 29 14	2864	88 58 31	2785	76 14 47	2717
9	116 42 32	2989	67 37 45	2822	112 14 27	2939	99 56 9	2854	87 23 44	2776	74 38 29	2708
12	118 12 57	2979	69 11 44	2811	110 42 58	2928	98 22 51	2843	85 48 44	2767	73 2 0	2701
15	119 43 38	2969	70 45 58	2800	109 11 15	2917	96 49 19	2834	84 13 33	2759	71 25 21	2693
18	121 14 30	2958	72 20 26	2789	107 39 18	2906	95 15 35	2824	82 38 11	2749	69 48 31	2686
21	122 45 34	2950	73 55 8	2779	106 7 7	2896	93 41 38	2814	81 2 36	2741	68 11 32	2678

h.	FEB. 25. SUN E. ° ′ ″	P. L.	FEB. 26. SUN E. ° ′ ″	P. L.	FEB. 27. SUN E. ° ′ ″	P. L.	FEB. 28. SUN E. ° ′ ″	P. L.	MARCH 1. SUN E. ° ′ ″	P. L.	MARCH 2. SUN E. ° ′ ″	P. L.
0	140 17 16	2836	127 42 27	2769	114 57 0	2716	102 3 1	2673	89 2 0	2638	75 55 23	2613
3	138 43 35	2828	126 7 18	2761	113 20 41	2711	100 25 45	2668	87 23 56	2635	74 16 46	2610
6	137 9 43	2818	124 31 59	2754	111 44 15	2704	98 48 22	2663	85 45 48	2631	72 38 5	2608
9	135 35 38	2808	122 56 31	2747	110 7 40	2699	97 10 53	2659	84 7 35	2627	70 59 21	2606
12	134 1 21	2800	121 20 54	2741	108 30 58	2693	95 33 18	2655	82 29 17	2624	69 20 34	2604
15	132 26 54	2792	119 45 8	2735	106 54 9	2689	93 55 37	2650	80 50 55	2621	67 41 45	2602
18	130 52 15	2784	118 9 14	2728	105 17 14	2683	92 17 50	2646	79 12 28	2618	66 2 53	2602
21	129 17 26	2776	116 33 11	2722	103 40 11	2678	90 39 57	2643	77 33 58	2615	64 24 1	2601

h.	MARCH 3. SUN E. ° ′ ″	P. L.	MARCH 4. SUN E. ° ′ ″	P. L.	MARCH 5. SUN E. ° ′ ″	P. L.	MARCH 10. SUN W. ° ′ ″	P. L.	MARCH 11. SUN W. ° ′ ″	P. L.	MARCH 12. SUN W. ° ′ ″	P. L.
0	62 45 7	2600	49 33 58	2607	36 26 14	2644	27 20 54	3096	39 20 0	3184	50 44 54	3292
3	61 6 12	2599	47 55 12	2610	34 48 19	2652	28 8 9	3105	40 46 28	3196	52 9 26	3294
6	59 27 16	2600	46 16 39	2613	33 10 34	2661	30 36 13	3115	42 12 42	3209	53 33 45	3306
9	57 48 21	2599	44 37 52	2616	31 33 2	2671	32 4 4	3125	43 38 40	3221	54 57 50	3316
12	56 9 25	2601	42 59 19	2621	29 55 43	2681	33 31 43	3136	45 4 24	3234	56 21 43	3327
15	54 30 31	2602	41 20 52	2626	28 18 38	2695	34 59 9	3148	46 29 53	3246	57 45 23	3339
18	52 51 38	2603	39 42 32	2631	26 41 51	2710	36 26 20	3160	47 55 8	3259	59 8 50	3348
21	51 12 47	2604	38 4 19	2637	25 5 24	2725	37 53 17	3172	49 20 8	3271	60 32 6	3359

h.	MARCH 13. SUN W. ° ′ ″	P. L.	MARCH 14. SUN W. ° ′ ″	P. L.	MARCH 15. SUN W. ° ′ ″	P. L.	MARCH 16. SUN W. ° ′ ″	P. L.	MARCH 17. SUN W. ° ′ ″	P. L.	MARCH 18. SUN W. ° ′ ″	P. L.
0	61 55 10	3367	72 53 48	3430	83 44 58	3463	94 33 25	3462	105 24 9	3428	116 22 0	3365
3	63 18 4	3378	74 15 31	3436	85 6 4	3464	95 54 32	3460	106 45 54	3422	117 44 57	3354
6	64 40 46	3388	75 37 7	3441	86 27 8	3465	97 15 41	3456	108 7 46	3415	119 8 6	3345
9	66 3 19	3394	76 58 37	3446	87 48 11	3466	98 36 54	3453	109 29 46	3408	120 31 26	3333
12	67 25 42	3402	78 20 2	3451	89 9 13	3466	99 58 11	3448	110 51 54	3400	121 54 59	3323
15	68 47 56	3410	79 41 21	3454	90 30 15	3466	101 19 33	3445	112 14 11	3392	123 18 44	3312
18	70 10 1	3416	81 2 37	3457	91 51 17	3465	102 40 59	3439	113 36 37	3383	124 42 42	3301
21	71 31 59	3424	82 23 49	3460	93 12 20	3463	104 2 31	3434	114 59 13	3373	126 6 53	3288

h.	MARCH 19. SUN W. ° ′ ″	P. L.	MARCH 20. ALDEBARAN W. ° ′ ″	P. L.	MARCH 21. MARS E. ° ′ ″	P. L.	MARCH 22. MARS E. ° ′ ″	P. L.	MARCH 23. MARS E. ° ′ ″	P. L.	MARCH 24. MARS E. ° ′ ″	P. L.
0	127 31 18	3277	70 58 14	2806	125 55 47	2904	113 28 59	2785	100 42 17	2678	87 37 44	2589
3	128 55 57	3264	72 32 34	2792	124 23 33	2889	111 54 12	2771	99 5 8	2666	85 58 34	2580
6	130 20 51	3252	74 7 12	2778	122 51 0	2874	110 19 7	2757	97 27 43	2654	84 19 11	2570
9	131 45 59	3238	75 42 9	2765	121 18 8	2859	108 43 43	2744	95 50 1	2643	82 39 35	2561
12	133 11 22	3227	77 17 23	2750	119 44 5	2844	107 8 2	2730	94 12 4	2631	80 59 46	2553
15	134 36 59	3213	78 52 56	2736	118 11 25	2829	105 32 2	2717	92 33 51	2620	79 19 46	2545
18	136 2 53	3201	80 28 48	2723	116 37 35	2815	103 55 44	2704	90 55 23	2610	77 39 35	2537
21	137 29 1	3188	82 4 58	2708	115 3 26	2801	102 19 9	2691	89 16 41	2599	75 59 13	2530

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	MARCH 25		MARCH 26.		MARCH 27.		MARCH 28.		MARCH 29.		MARCH 30.	
	MARS E.		MARS E.		SUN E.		SUN E.		SUN E.		SUN E.	
h.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.
0	74 18 42	2522	60 49 31	2483	132 22 20	2589	119 8 8	2583	105 54 26	2596	92 44 10	2621
3	72 38 0	2516	59 7 54	2480	130 43 10	2587	117 28 49	2584	104 15 25	2598	91 5 43	2625
6	70 57 10	2510	57 26 12	2477	129 3 57	2585	115 49 32	2584	102 36 27	2601	89 27 22	2629
9	69 16 11	2505	55 44 27	2475	127 24 41	2584	114 10 15	2586	100 57 33	2604	87 49 7	2633
12	67 35 4	2499	54 2 38	2473	125 45 24	2583	112 31 1	2587	99 18 44	2607	86 10 57	2638
15	65 53 50	2495	52 20 47	2472	124 6 6	2582	110 51 48	2589	97 39 58	2610	84 32 53	2642
18	64 12 30	2490	50 38 54	2471	122 26 46	2583	109 12 38	2591	96 1 17	2614	82 54 55	2646
21	62 31 3	2487	48 57 0	2470	120 47 27	2583	107 33 30	2593	94 22 41	2618	81 17 3	2652

	MARCH 31.		APRIL 1.		APRIL 2.		APRIL 3.		APRIL 4.		APRIL 8.	
	SUN E.		SUN E.		SUN E.		SUN E.		MARS W.		REGULUS E.	
0	79 39 18	2655	66 41 15	2699	53 51 20	2747	41 11 0	2809	60 0 12	2742	109 30 13	2863
3	78 1 38	2661	65 4 33	2704	52 15 43	2755	39 36 44	2818	61 35 56	2751	107 57 6	2874
6	76 24 6	2666	63 27 58	2710	50 40 16	2763	38 2 39	2827	63 11 28	2759	106 24 13	2883
9	74 46 40	2671	61 51 31	2716	49 4 59	2769	36 28 46	2836	64 46 50	2768	104 51 32	2892
12	73 9 21	2675	60 15 12	2722	47 29 51	2777	34 55 5	2846	66 22 0	2776	103 19 3	2902
15	71 32 8	2681	58 39 1	2728	45 54 53	2785	33 21 37	2856	67 56 59	2785	101 46 47	2912
18	69 55 3	2687	57 2 58	2735	44 20 5	2792	31 48 21	2866	69 31 47	2794	100 14 43	2922
21	68 18 6	2692	55 27 5	2741	42 45 27	2801	30 15 19	2877	71 6 23	2803	98 42 52	2931

	APRIL 9.		APRIL 10.		APRIL 11.		APRIL 12.		APRIL 13.		APRIL 14.	
	SUN W.		SUN W.		SUN W.		SUN W.		SUN W.		SUN W.	
0	31 0 21	3307	42 8 30	3371	53 7 32	3422	64 0 15	3450	74 50 34	3449	85 43 4	3416
3	32 24 25	3314	43 31 20	3378	54 29 24	3427	65 21 35	3452	76 11 55	3447	87 5 2	3410
6	33 48 20	3323	44 54 2	3386	55 51 10	3431	66 42 53	3453	77 33 18	3444	88 27 7	3403
9	35 12 5	3331	46 16 35	3392	57 12 51	3436	68 4 10	3454	78 54 45	3441	89 49 20	3396
12	36 35 41	3339	47 39 1	3399	58 34 27	3439	69 25 26	3454	80 16 15	3438	91 11 41	3388
15	37 59 7	3347	49 1 19	3405	59 56 0	3443	70 46 42	3454	81 37 49	3432	92 34 11	3379
18	39 22 24	3356	50 23 30	3411	61 17 28	3446	72 7 58	3452	82 59 29	3429	93 56 51	3371
21	40 45 31	3363	51 45 34	3416	62 38 53	3448	73 29 16	3452	84 21 13	3423	95 14 41	3361

	APRIL 15.		APRIL 16.		APRIL 17.		APRIL 18.		APRIL 19.		APRIL 20.	
	SUN W.		SUN W.		SUN W.		SUN W.		MARS E.		MARS E.	
0	96 42 42	3352	107 54 27	3255	119 23 3	3134	131 12 22	2996	122 9 20	2740	109 12 1	2601
3	98 5 54	3341	109 19 31	3241	120 50 31	3118	132 42 38	2979	120 33 33	2723	107 33 7	2585
6	99 29 18	3330	110 44 52	3227	122 18 19	3102	134 13 17	2962	118 57 23	2704	105 53 51	2568
9	100 52 55	3318	112 10 29	3213	123 46 26	3084	135 44 17	2944	117 20 48	2686	104 14 12	2553
12	102 16 46	3307	113 36 23	3198	125 14 55	3068	137 15 40	2926	115 43 49	2669	102 34 12	2538
15	103 40 50	3295	115 2 35	3182	126 43 44	3050	138 47 26	2908	114 6 27	2652	100 53 52	2522
18	105 5 7	3282	116 29 6	3167	128 12 55	3032	140 19 35	2891	112 28 42	2634	99 13 10	2509
21	106 29 40	3270	117 55 55	3151	129 42 28	3015	141 52 5	2873	110 50 33	2617	97 32 9	2495

	APRIL 21.		APRIL 22.		APRIL 23.		APRIL 24.		APRIL 25.		APRIL 26.	
	MARS E.		MARS E.		MARS E.		MARS E.		SUN E.		SUN E.	
0	95 50 49	2481	82 9 42	2392	68 14 45	2342	54 13 38	2335	136 23 33	2443	122 46 43	2491
3	94 9 9	2468	80 25 56	2384	66 29 46	2339	52 28 29	2337	134 41 0	2448	121 5 17	2499
6	92 27 12	2455	78 41 59	2376	64 44 43	2336	50 43 23	2340	132 58 34	2453	119 24 2	2507
9	90 44 56	2444	76 57 50	2369	62 59 36	2334	48 58 22	2344	131 16 15	2459	117 42 58	2515
12	89 2 24	2433	75 13 30	2362	61 14 26	2333	47 13 27	2349	129 34 4	2464	116 2 6	2524
15	87 19 36	2422	73 29 1	2356	59 29 15	2332	45 28 39	2355	127 52 0	2470	114 21 26	2533
18	85 36 32	2412	71 44 23	2350	57 44 2	2332	43 43 59	2361	126 10 5	2477	112 40 58	2541
21	83 53 14	2402	69 59 37	2346	55 58 49	2333	41 59 28	2368	124 28 19	2484	111 0 42	2551

	APRIL 27.		APRIL 28.		APRIL 29.		APRIL 30.		MAY 1.		MAY 2.	
	SUN E.		SUN E.		SUN E.		SUN E.		SUN E.		SUN E.	
0	109 20 40	2561	96 8 36	2643	83 11 59	2732	70 31 0	2818	58 5 0	2904	45 53 5	2985
3	107 40 51	2570	94 30 40	2654	81 36 1	2742	68 56 56	2830	56 32 46	2914	44 22 33	2993
6	106 1 15	2580	92 52 58	2665	80 0 17	2753	67 23 7	2841	55 0 45	2924	42 52 12	3003
9	104 21 53	2591	91 15 31	2676	78 24 48	2764	65 49 32	2851	53 28 56	2935	41 22 3	3014
12	102 42 46	2601	89 38 19	2687	76 49 33	2776	64 16 10	2862	51 57 21	2944	39 52 7	3022
15	101 3 52	2611	88 1 22	2699	75 14 33	2787	62 43 2	2873	50 25 58	2954	38 22 22	3033
18	99 25 12	2622	86 24 40	2709	73 39 48	2797	61 10 [illegible]	2883	48 54 48	2964	36 52 50	3042
21	97 46 47	2632	84 48 12	2720	72 5 16	2809	59 37 27	2894	47 23 50	2974	35 23 29	3051

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	MAY 3.		MAY 9.		MAY 10.		MAY 11.		MAY 12.		MAY 13.	
	SUN E.		SUN W.		SUN W.		SUN W.		SUN W.		SUN W.	
h.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.
0	33 54 19	3061	34 10 7	3425	45 3 2	3445	55 54 22	3442	66 47 54	3412	77 47 58	3351
3	32 25 22	3070	35 31 55	3428	46 21 28	3446	57 15 51	3439	68 9 57	3406	79 11 11	3342
6	30 56 36	3079	36 53 40	3431	47 45 53	3447	58 37 23	3437	69 32 7	3400	80 34 34	3331
9	29 28 1	3089	38 15 21	3434	49 7 17	3447	59 58 58	3434	70 54 24	3392	81 58 10	3321
12	27 59 38	3099	39 36 59	3438	50 28 41	3447	61 20 36	3431	72 16 49	3385	83 21 57	3309
15	26 31 27	3107	40 58 33	3439	51 50 5	3447	62 42 18	3426	73 39 23	3378	84 45 58	3298
18	25 3 26	3118	42 20 5	3442	53 11 29	3445	64 4 5	3422	75 2 5	3369	85 10 12	3286
21	23 35 38	3126	43 41 34	3443	54 32 55	3444	65 25 56	3416	76 24 57	3361	87 34 40	3274

	MAY 14.		MAY 15.		MAY 16.		MAY 17.		MAY 18.		MAY 19.	
	SUN W.		SUN W.		SUN W.		SUN W.		MARS E.		MARS E.	
0	88 59 22	3260	100 27 0	3142	112 15 29	2999	124 28 43	2842	116 27 58	2580	103 0 39	2432
3	90 24 20	3247	101 54 19	3124	113 45 43	2980	126 2 16	2823	114 48 36	2560	101 17 50	2415
6	91 49 34	3233	103 21 59	3107	115 16 21	2961	127 36 14	2803	113 8 46	2541	99 34 37	2399
9	93 15 4	3219	104 50 0	3090	116 47 23	2942	129 10 38	2783	111 28 30	2523	97 51 1	2384
12	94 40 51	3204	106 18 22	3073	118 18 49	2922	130 45 28	2763	109 47 48	2503	96 7 3	2368
15	96 6 56	3188	107 47 5	3055	119 50 40	2904	132 20 44	2743	108 6 39	2485	94 22 42	2354
18	97 33 19	3173	109 16 10	3036	121 22 56	2883	133 56 27	2724	106 25 4	2467	92 38 1	2340
21	99 0 0	3158	110 45 38	3018	122 55 37	2863	135 32 35	2704	104 43 4	2449	90 53 0	2326

	MAY 20.		MAY 21.		MAY 22.		MAY 23.		MAY 24.		MAY 25.	
	MARS E.		MARS E.		MARS E.		JUPITER E.		SUN E.		SUN E.	
0	89 7 39	2314	74 55 8	2238	60 32 0	2214	119 56 50	2104	140 3 36	2373	126 17 18	2467
3	87 22 0	2302	73 7 37	2231	58 43 53	2216	118 6 6	2109	138 19 23	2384	124 35 19	2481
6	85 36 3	2290	71 19 56	2227	56 55 49	2218	116 15 20	2113	136 35 25	2395	122 53 39	2495
9	83 49 49	2280	69 32 9	2222	55 7 48	2221	114 24 41	2120	134 51 43	2405	121 12 18	2510
12	82 3 20	2270	67 44 14	2219	53 19 51	2225	112 34 12	2126	133 8 16	2417	119 31 18	2524
15	80 16 36	2261	65 56 15	2217	51 32 1	2231	110 43 52	2133	131 25 5	2429	117 50 38	2538
18	78 29 39	2252	64 8 12	2215	49 44 19	2237	108 53 43	2140	129 42 11	2441	116 10 18	2553
21	76 42 29	2245	62 20 6	2215	47 56 47	2245	107 3 45	2149	127 59 35	2455	114 30 19	2569

	MAY 26.		MAY 27.		MAY 28.		MAY 29.		MAY 30.		MAY 31.	
	SUN E.		SUN E.		SUN E.		SUN E.		SUN E.		SUN E.	
0	112 50 41	2584	99 46 25	2711	87 4 52	2838	74 44 43	2957	62 43 40	3063	50 59 4	3154
3	111 11 24	2599	98 10 0	2727	85 31 13	2853	73 13 36	2970	61 14 45	3075	49 32 0	3166
6	109 32 28	2615	96 33 56	2743	83 57 54	2868	71 42 46	2984	59 46 5	3087	48 5 10	3175
9	107 53 54	2631	94 58 13	2759	82 24 54	2884	70 12 13	2998	58 17 40	3099	46 38 31	3186
12	106 15 41	2647	93 22 51	2776	80 52 14	2899	68 41 54	3011	56 49 29	3110	45 12 5	3196
15	104 37 50	2663	91 47 51	2791	79 19 54	2913	67 11 59	3025	55 21 32	3122	43 45 51	3205
18	103 0 20	2679	90 13 11	2806	77 47 52	2928	65 42 17	3036	53 53 49	3134	42 19 48	3214
21	101 23 12	2695	88 38 51	2822	76 16 8	2943	64 12 51	3050	52 26 20	3144	40 53 55	3224

	JUNE 1.		JUNE 7.		JUNE 8.		JUNE 9.		JUNE 10.		JUNE 11.	
	SUN E.		SUN W.		SUN W.		SUN W.		SUN W.		SUN W.	
0	39 28 14	3235	26 56 17	3452	37 47 35	3435	48 42 16	3403	59 43 24	3347	70 54 48	3265
3	38 2 44	3242	28 17 35	3451	39 9 12	3433	50 4 29	3397	61 6 41	3339	72 19 40	3254
6	36 37 25	3251	29 38 54	3449	40 30 51	3430	51 26 49	3392	62 30 8	3330	73 44 45	3242
9	35 12 16	3259	31 0 15	3447	41 52 34	3426	52 49 15	3386	63 53 45	3319	75 10 5	3228
12	33 47 17	3268	32 21 30	3446	43 14 21	3423	54 11 48	3378	65 17 34	3310	76 35 41	3215
15	32 22 28	3276	33 43 4	3443	44 36 12	3418	55 34 30	3372	66 41 34	3300	78 1 32	3202
18	30 57 48	3285	35 4 32	3441	45 58 8	3413	56 57 19	3364	68 5 46	3288	79 27 39	3188
21	29 33 19	3292	36 26 2	3439	47 20 10	3409	58 20 17	3356	69 30 11	3278	80 54 3	3173

	JUNE 12.		JUNE 13.		JUNE 14.		JUNE 15.		JUNE 16.		JUNE 17.	
	SUN W.		SUN W.		SUN W.		SUN W.		MARS E.		MARS E.	
0	82 20 44	3158	94 5 34	3027	106 13 26	2878	118 47 33	2720	106 59 18	2425	93 3 21	2287
3	83 47 43	3143	95 35 13	3010	107 46 13	2859	120 23 46	2701	105 16 19	2406	91 17 2	2272
6	85 15 0	3129	97 5 14	2992	109 19 25	2839	122 0 25	2681	103 32 53	2387	89 30 21	2258
9	86 42 36	3112	98 35 37	2973	110 53 2	2820	123 37 30	2662	101 49 0	2370	87 43 19	2244
12	88 10 31	3096	100 6 24	2954	112 27 4	2800	125 15 1	2642	100 4 42	2352	85 55 57	2231
15	89 38 46	3079	101 37 34	2936	114 1 32	2779	126 52 59	2624	98 19 58	2335	84 8 16	2219
18	91 7 21	3062	103 9 7	2917	115 36 27	2760	128 31 22	2604	96 34 49	2319	82 20 17	2208
21	92 36 17	3045	104 41 4	2898	117 11 47	2741	130 10 11	2585	94 49 17	2302	80 32 1	2197

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h.	JUNE 18. MARS E. ° ′ ″	P. L.	JUNE 19. MARS E. ° ′ ″	P. L.	JUNE 20. JUPITER E. ° ′ ″	P. L.	JUNE 21. JUPITER E. ° ′ ″	P. L.	JUNE 22. JUPITER E. ° ′ ″	P. L.	JUNE 23. SUN E. ° ′ ″	P. L.
0	78 43 29	2180	64 8 1	2140	117 3 14	2026	102 2 57	2067	87 15 26	2154	130 8 24	2520
3	76 54 41	2178	62 18 3	2138	115 10 20	2028	100 11 7	2070	85 25 49	2167	128 27 39	2538
6	75 5 40	2170	60 28 2	2138	113 17 30	2032	98 19 31	2085	83 36 32	2182	126 47 18	2555
9	73 16 27	2162	58 38 1	2139	111 24 45	2035	96 28 9	2095	81 47 37	2196	125 7 21	2573
12	71 27 2	2156	56 48 1	2141	109 32 6	2040	94 37 2	2105	79 59 3	2211	123 27 49	2591
15	69 37 28	2151	54 58 4	2145	107 39 34	2046	92 46 11	2117	78 10 52	2226	121 48 42	2609
18	67 47 46	2145	53 8 13	2149	105 47 12	2052	90 55 38	2128	76 23 3	2242	120 9 59	2628
21	65 57 56	2142	51 18 28	2155	103 54 59	2059	89 5 22	2141	74 35 38	2258	118 31 42	2646

	JUNE 24. SUN E.		JUNE 25. SUN E.		JUNE 26. SUN E.		JUNE 27. SUN E.		JUNE 28. SUN E.		JUNE 29. SUN E.	
0	116 53 50	2660	104 6 7	2817	91 44 33	2964	79 46 39	3096	68 8 56	3209	56 47 36	3300
3	115 16 24	2683	102 32 1	2837	90 13 35	2981	78 18 24	3111	66 42 57	3221	55 23 24	3310
6	113 39 22	2704	100 58 21	2855	88 42 59	2998	76 50 28	3126	65 17 13	3233	53 59 24	3319
9	112 2 47	2722	99 25 4	2873	87 12 44	3015	75 22 50	3141	63 51 43	3245	52 35 35	3329
12	110 26 36	2741	97 52 11	2892	85 42 50	3033	73 55 30	3155	62 26 27	3257	51 11 57	3338
15	108 50 51	2760	96 19 42	2910	84 13 18	3048	72 28 27	3168	61 1 25	3268	49 48 20	3346
18	107 15 31	2780	94 47 36	2928	82 44 5	3065	71 1 40	3183	59 36 36	3279	48 25 11	3355
21	105 40 37	2798	93 15 53	2946	81 15 12	3081	69 35 10	3196	58 12 0	3289	47 2 3	3364

	JUNE 30. SUN E.		JULY 1. SUN E.		JULY 7. SUN W.		JULY 8. SUN W.		JULY 9. SUN W.		JULY 10. SUN W.	
0	45 39 5	3371	34 40 24	3428	31 14 34	3396	42 17 47	3329	53 31 59	3250	64 59 33	3156
3	44 16 15	3379	33 18 39	3435	32 36 55	3388	43 41 25	3319	54 57 9	3240	66 26 35	3143
6	42 53 34	3386	31 57 2	3442	33 59 25	3379	45 5 14	3311	56 22 31	3229	67 53 52	3129
9	41 31 2	3394	30 35 33	3448	35 22 5	3372	46 29 13	3301	57 48 6	3217	69 21 26	3116
12	40 8 39	3401	29 14 11	3455	36 44 53	3363	47 53 23	3291	59 13 55	3205	70 49 16	3101
15	38 46 23	3408	27 52 57	3463	38 7 52	3355	49 17 45	3282	60 39 58	3194	72 17 24	3087
18	37 24 16	3415	26 31 52	3470	39 31 0	3346	50 42 17	3271	62 6 14	3181	73 45 49	3074
21	36 2 16	3422	25 10 54	3480	40 54 18	3337	52 7 2	3261	63 32 46	3168	75 14 31	3058

	JULY 11. SUN W.		JULY 12. SUN W.		JULY 13. SUN W.		JULY 14. SUN W.		JULY 15. SUN W.		JULY 16. MARS E.	
0	76 43 32	3043	88 47 16	2915	101 13 44	2774	114 4 57	2632	127 21 5	2502	75 55 38	2173
3	78 12 51	3028	90 19 16	2897	102 48 46	2757	115 43 8	2615	129 2 15	2487	74 6 30	2163
6	79 42 29	3012	91 51 39	2880	104 24 10	2738	117 21 42	2599	130 43 46	2474	72 17 6	2154
9	81 12 27	2997	93 24 23	2863	105 59 59	2721	119 0 39	2581	132 25 36	2460	70 27 29	2146
12	82 42 44	2981	94 57 30	2845	107 36 11	2703	120 40 0	2565	134 7 46	2447	68 37 40	2138
15	84 13 21	2965	96 30 59	2828	109 12 47	2685	122 19 43	2549	135 50 14	2434	66 47 39	2131
18	85 44 18	2948	98 4 51	2810	110 49 47	2668	123 59 48	2533	137 33 0	2423	64 57 27	2126
21	87 15 36	2931	99 39 6	2792	112 27 10	2650	125 40 16	2517	139 16 2	2412	63 7 8	2121

	JULY 17. MARS E.		JULY 18. JUPITER E.		JULY 19. JUPITER E.		JULY 20. JUPITER E.		JULY 21. JUPITER E.		JULY 22. SUN E.	
0	61 16 41	2118	113 4 10	2018	98 0 6	2037	83 4 24	2104	68 26 16	2212	134 45 58	2638
3	59 26 9	2116	111 11 3	2018	96 7 29	2042	81 13 31	2115	66 38 6	2228	133 7 54	2656
6	57 35 34	2115	109 17 56	2018	94 15 0	2049	79 22 55	2127	64 50 20	2244	131 30 15	2675
9	55 44 57	2115	107 24 49	2019	92 22 42	2056	77 32 37	2140	63 2 58	2260	129 53 1	2693
12	53 54 20	2117	105 31 44	2021	90 30 35	2064	75 42 39	2153	61 16 0	2278	128 16 11	2712
15	52 3 46	2119	103 38 42	2023	88 38 41	2073	73 53 1	2167	59 29 28	2295	126 39 47	2732
18	50 13 16	2124	101 45 44	2027	86 47 0	2083	72 3 44	2182	57 43 21	2313	125 3 49	2751
21	48 22 54	2130	99 52 52	2031	84 55 34	2093	70 14 49	2196	55 57 40	2331	123 28 17	2770

	JULY 23. SUN E.		JULY 24. SUN E.		JULY 25. SUN E.		JULY 26. SUN E.		JULY 27. SUN E.		JULY 28. SUN E.	
0	121 53 10	2789	109 27 32	2946	97 27 46	3093	85 50 41	3220	74 32 8	3334	63 27 41	3400
3	120 18 28	2810	107 56 12	2966	95 59 28	3110	84 24 56	3236	73 8 24	3334	62 5 24	3408
6	118 44 13	2829	106 25 16	2984	94 31 31	3127	82 59 29	3248	71 44 52	3345	60 43 16	3415
9	117 10 23	2849	104 54 43	3004	93 3 54	3144	81 34 17	3263	70 21 33	3355	59 21 16	3422
12	115 36 58	2869	103 24 35	3022	91 36 38	3160	80 9 22	3276	68 58 25	3365	57 59 24	3429
15	114 3 59	2888	101 54 49	3040	90 9 41	3175	78 44 42	3288	67 35 29	3374	56 37 40	3434
18	112 31 25	2908	100 25 26	3058	88 43 2	3191	77 20 16	3301	66 12 43	3383	55 16 2	3440
21	110 59 16	2928	98 56 25	3076	87 16 43	3206	75 56 5	3313	64 50 7	3392	53 54 31	3446

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	JULY 29.		JULY 30.		AUG. 6.		AUG. 7.		AUG. 8.		AUG. 9.	
	SUN E.		SUN E.		SUN W.		SUN W.		SUN W.		SUN W.	
h.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.
0	52 33 6	3451	41 44 46	3482	36 27 3	3207	48 1 43	3111	59 51 43	3017	71 58 9	2913
3	51 11 47	3455	40 24 2	3485	37 53 4	3196	49 29 37	3102	61 21 35	3004	73 30 12	2899
6	49 50 33	3460	39 3 21	3485	39 19 18	3183	50 57 44	3089	62 51 43	2991	75 2 32	2886
9	48 29 24	3464	37 42 44	3490	40 45 47	3172	52 26 7	3077	64 22 7	2978	76 35 9	2873
12	47 8 20	3469	36 22 9	3494	42 12 30	3160	53 54 45	3065	65 52 47	2966	78 8 3	2859
15	45 47 21	3472	35 1 38	3497	43 39 27	3148	55 23 37	3054	67 23 43	2953	79 41 15	2845
18	44 26 25	3476	33 41 10	3499	45 6 38	3136	56 52 43	3041	68 54 55	2939	81 14 45	2831
21	43 5 34	3479	32 20 45	3503	46 34 4	3125	58 22 5	3028	70 26 24	2927	82 48 33	2816

	AUG. 10.		AUG. 11.		AUG. 12.		AUG. 13.		AUG. 14.		AUG. 15.	
	SUN W.		SUN W.		SUN W.		SUN W.		JUPITER E.		JUPITER E.	
0	84 22 40	2803	97 6 36	2690	110 10 27	2581	123 33 3	2488	121 37 38	2116	106 48 48	2076
3	85 57 4	2789	98 43 30	2676	111 49 48	256.	125 14 33	2478	119 47 3	2109	104 57 12	2074
6	87 31 47	2774	100 20 42	2661	113 29 26	2556	126 56 17	2470	117 56 18	2103	103 5 32	2072
9	89 6 49	2760	101 58 14	2649	115 9 22	2544	128 38 13	2460	116 5 23	2097	101 13 50	2072
12	90 42 9	2747	103 36 3	2634	116 49 34	2532	130 20 22	2452	114 14 19	2091	99 22 7	2070
15	92 17 47	2732	105 14 12	2621	118 30 3	2520	132 2 43	2445	112 23 6	2086	97 30 22	2071
18	93 53 45	2718	106 52 39	2607	120 10 48	2510	133 45 14	2438	110 31 46	2083	95 38 38	2072
21	95 30 1	2704	108 31 24	2594	121 51 48	2499	135 27 55	2431	108 40 20	2079	93 46 56	2074

	AUG. 16.		AUG. 17.		AUG. 18.		AUG. 19.		AUG. 20.		AUG. 21.	
	JUPITER E.		JUPITER E.		JUPITER E.		JUPITER E.		SUN E.		SUN E.	
0	91 55 16	2076	77 5 36	2119	62 28 21	2202	48 10 46	2319	140 26 35	2795	128 0 28	2936
3	90 3 40	2079	75 15 6	2128	60 39 57	2216	46 25 14	2335	138 52 1	2811	126 28 55	2954
6	88 12 9	2083	73 24 49	2136	58 51 53	2229	44 40 5	2352	137 17 48	2829	124 57 45	2973
9	86 20 43	2087	71 34 45	2146	57 4 8	2243	42 55 21	2369	135 43 58	2846	123 26 58	2990
12	84 29 24	2092	69 44 56	2156	55 16 44	2257	41 11 1	2387	134 10 30	2864	121 56 33	3009
15	82 38 13	2098	67 55 22	2167	53 29 41	2272	39 27 7	2403	132 37 25	2882	120 26 31	3027
18	80 47 11	2104	66 6 5	2178	51 43 0	2287	37 43 37	2422	131 4 43	2900	118 56 52	3044
21	78 56 18	2111	64 17 4	2190	49 56 42	2302	36 0 33	2440	129 32 24	2918	117 27 34	3063

	AUG. 22.		AUG. 23.		AUG. 24.		AUG. 25.		AUG. 26.		AUG. 27.	
	SUN E.		SUN E.		SUN E.		SUN E.		SUN E.		SUN E.	
0	115 58 39	3080	104 19 36	3211	92 59 54	3319	81 55 7	3400	71 0 28	3449	60 11 17	3469
3	114 30 5	3097	102 53 40	3226	91 36 5	3332	80 32 50	3408	69 39 7	3453	58 50 18	3470
6	113 1 52	3115	101 28 2	3240	90 12 30	3342	79 10 43	3415	68 17 50	3456	57 29 20	3470
9	111 34 0	3131	100 2 40	3255	88 49 7	3353	77 48 43	3422	66 56 37	3460	56 8 22	3470
12	110 6 28	3148	98 37 36	3269	87 25 57	3363	76 26 51	3428	65 35 28	3463	54 47 24	3469
15	108 39 16	3164	97 12 48	3282	86 2 58	3373	75 5 6	3433	64 14 22	3464	53 26 25	3468
18	107 12 24	3180	95 48 15	3294	84 40 11	3382	73 43 27	3439	62 53 18	3467	52 5 25	3467
21	105 45 51	3195	94 23 57	3307	83 17 34	3391	72 21 55	3444	61 32 17	3468	50 44 24	3465

	AUG. 28.		AUG. 29.		SEPT. 4.		SEPT. 5.		SEPT 6.		SEPT. 7.	
	SUN E.		SUN E.		SUN W.		SUN W.		SUN W.		SUN W.	
0	49 23 21	3463	38 33 20	3440	30 54 3	3029	42 58 20	2931	55 17 40	2850	67 50 38	2773
3	48 2 16	3461	37 11 49	3438	32 23 40	3016	44 29 59	2922	56 51 3	2840	69 25 41	2764
6	46 41 8	3459	35 50 15	3434	33 53 33	3002	46 1 50	2910	58 24 39	2830	71 0 50	2755
9	45 19 58	3456	34 28 37	3431	35 23 43	2989	47 33 56	2900	59 58 28	2821	72 36 23	2745
12	43 58 45	3454	33 6 55	3428	36 54 9	2978	49 6 15	2890	61 32 29	2811	74 12 3	2736
15	42 37 29	3451	31 45 10	3425	38 24 50	2966	50 38 47	2880	63 6 42	2802	75 47 55	2727
18	41 16 10	3447	30 23 22	3423	39 55 46	2954	52 11 31	2870	64 41 8	2792	77 23 59	2718
21	39 54 46	3445	29 1 31	3421	41 26 56	2943	53 44 29	2859	66 15 47	2782	79 0 15	2709

	SEPT. 8.		SEPT. 9.		SEPT. 10.		SEPT. 11.		SEPT. 12.		SEPT. 13.	
	SUN W.		SUN W.		SUN W.		SUN W.		JUPITER E.		JUPITER E.	
0	80 36 42	2700	93 35 31	2632	106 46 5	2572	120 6 31	2526	97 21 9	2171	82 47 4	2170
3	82 13 23	2691	95 13 43	2624	108 25 39	2565	121 47 8	2523	95 31 58	2169	80 57 51	2172
6	83 50 15	2682	96 52 6	2615	110 5 22	2559	123 27 49	2519	93 42 44	2168	79 8 41	2174
9	85 27 19	2674	98 30 40	2607	111 45 14	2553	125 8 36	2515	91 53 28	2167	77 19 34	2177
12	87 4 34	2665	100 9 25	2600	113 25 14	2546	126 49 28	2513	90 4 11	2167	75 30 32	2180
15	88 42 1	2656	101 48 20	2593	115 5 23	2541	128 30 23	2510	88 14 54	2167	73 41 34	2184
18	90 19 40	2648	103 27 25	2585	116 45 39	2536	130 11 22	2509	86 25 36	2168	71 52 43	2188
21	91 57 30	2640	105 6 40	2578	118 26 2	2532	131 52 23	2507	84 36 20	2168	70 3 58	2193

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	SEPT. 14.		SEPT. 15.		SEPT. 16.		SEPT. 17.		SEPT. 18.		SEPT. 19.	
	JUPITER E.		JUPITER E.		JUPITER E.		JUPITER E.		MARS W.		SUN E.	
h.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.	° ′ ″	P. L.
0	68 15 19	2120	53 32 7	2250	39 43 24	2349	25 54 23	2467	67 52 44	2682	135 14 17	3084
3	66 26 51	2204	52 5 7	2308	37 38 36	2362	24 12 23	2484	69 29 48	2696	133 45 48	3099
6	64 38 30	2210	50 18 21	2279	36 14 6	2376	22 30 47	2502	71 6 34	2711	132 17 37	3115
9	62 50 18	2218	48 31 51	2289	34 29 57	2390	20 49 36	2520	72 43 0	2726	130 49 46	3130
12	61 2 17	2225	46 45 36	2300	32 46 8	2404	19 8 51	2540	74 19 6	2740	129 22 13	3145
15	59 14 26	2234	44 59 37	2312	31 2 39	2419	17 28 33	2561	75 54 53	2755	127 54 58	3160
18	57 26 47	2241	43 13 55	2324	29 19 32	2434	15 48 45	2583	77 30 20	2770	126 28 1	3175
21	55 39 20	2250	41 28 30	2337	27 36 46	2450	14 9 29	2612	79 5 27	2785	125 1 22	3190

	SEPT. 20.		SEPT. 21.		SEPT. 22.		SEPT. 23.		SEPT. 24.		SEPT. 25.	
	SUN E.		SUN E.		SUN E.		SUN E.		SUN E.		SUN E.	
0	123 35 1	3304	112 13 59	3310	101 7 41	3320	90 11 41	3430	79 21 2	3457	68 30 48	3441
3	122 8 57	3319	110 49 59	3321	99 45 13	3328	88 50 9	3444	77 59 50	3457	67 9 18	3438
6	120 43 10	3338	109 26 12	3332	98 22 55	3405	87 28 42	3447	76 38 38	3456	65 47 44	3423
9	119 17 39	3347	108 2 37	3344	97 0 44	3413	86 7 19	3451	75 17 25	3455	64 26 5	3429
12	117 52 25	3359	106 39 16	3353	95 38 42	3417	84 46 0	3453	73 56 10	3454	63 4 21	3423
15	116 27 28	3372	105 16 6	3363	94 16 47	3425	83 24 43	3455	72 34 54	3451	61 42 30	3416
18	115 2 42	3386	103 53 7	3372	92 54 59	3431	82 3 28	3456	71 13 35	3449	60 20 32	3410
21	113 38 14	3397	102 30 19	3381	91 33 17	3436	80 42 15	3456	69 52 14	3445	58 58 27	3404

	SEPT. 26.		SEPT. 27.		OCT. 4.		OCT. 5.		OCT. 6.		OCT. 7.	
	SUN E.		SUN E.		SUN W.		SUN W.		SUN W.		SUN W.	
0	57 36 15	3397	46 33 13	3329	38 7 30	2723	51 1 8	2674	64 1 54	2641	77 7 28	2621
3	56 13 55	3389	45 9 35	3319	39 43 49	2714	52 38 23	2669	65 39 53	2636	78 45 54	2619
6	54 51 26	3381	43 45 45	3308	41 20 10	2706	54 15 45	2664	67 17 56	2635	80 24 23	2618
9	53 28 48	3372	42 21 43	3298	42 56 39	2702	55 53 13	2660	68 56 3	2633	82 2 53	2616
12	52 6 1	3365	40 57 29	3288	44 33 17	2696	57 30 47	2656	70 34 13	2630	83 41 26	2615
15	50 43 5	3356	39 33 4	3277	46 10 3	2690	59 8 26	2652	72 12 27	2627	85 20 1	2614
18	49 19 58	3347	38 8 26	3267	47 46 57	2684	60 46 11	2649	73 50 45	2626	86 58 37	2613
21	47 56 41	3338	36 43 36	3256	49 23 59	2678	62 24 0	2645	75 29 5	2624	88 37 15	2611

	OCT. 8.		OCT. 9.		OCT. 10.		OCT. 11.		OCT. 12.		OCT. 13.	
	SUN W.		SUN W.		SUN W.		SUN W.		JUPITER E.		JUPITER E.	
0	90 15 55	2611	103 25 33	2609	116 34 42	2618	129 41 12	2641	56 16 38	2330	42 16 46	2373
3	91 54 35	2610	105 4 16	2610	118 13 12	2620	131 19 12	2645	54 31 8	2325	40 32 33	2381
6	93 33 16	2610	106 42 58	2610	119 51 40	2622	132 57 6	2649	52 45 45	2339	38 48 31	2389
9	95 11 58	2609	108 21 30	2611	121 30 5	2626	134 34 55	2653	51 0 32	2337	37 4 41	2398
12	96 50 41	2609	110 0 19	2613	123 8 26	2628	136 12 38	2658	49 15 27	2344	35 21 4	2406
15	98 29 24	2609	111 38 57	2613	124 46 43	2630	137 50 14	2662	47 30 31	2351	33 37 40	2417
18	100 8 7	2609	113 17 34	2615	126 24 57	2633	139 27 43	2669	45 45 46	2358	31 54 30	2427
21	101 46 50	2609	114 56 9	2616	128 3 7	2637	141 5 5	2675	44 1 11	2365	30 11 34	2438

	OCT. 14.		OCT. 15.		OCT. 16.		OCT. 17.		OCT. 18.		OCT. 19.	
	JUPITER E.		MARS W.		MARS W.		MARS W.		JUPITER W.		SUN E.	
0	28 28 53	9449	57 50 52	2732	70 32 1	2819	83 56 53	2930	24 23 5	2898	132 1 25	3313
3	26 46 32	9460	59 26 49	2742	72 6 4	2832	84 28 47	2933	25 56 50	2836	130 37 29	3324
6	25 4 19	2473	61 2 33	2753	73 39 50	2844	86 0 24	2946	27 30 40	2845	129 13 45	3334
9	23 22 28	2486	62 38 3	2763	75 13 21	2856	87 31 44	2958	29 4 9	2855	127 50 13	3345
12	21 40 55	2500	64 13 20	2773	76 46 36	2869	89 2 49	2972	30 37 25	2865	126 26 53	3353
15	19 59 42	2515	65 48 23	2785	78 19 35	2882	90 33 37	2985	32 10 29	2875	125 3 43	3364
18	18 18 50	2532	67 23 10	2796	79 52 17	2894	92 4 9	2998	33 43 20	2885	123 40 45	3372
21	16 38 22	2552	68 57 43	2808	81 24 43	2907	93 34 25	3010	35 15 58	2894	122 17 56	3380

	OCT. 20.		OCT. 21.		OCT. 22.		OCT. 23.		OCT. 24.		OCT. 25.	
	SUN E.		SUN E.		SUN E.		SUN E.		SUN E.		SUN E.	
0	120 55 17	3389	109 58 59	3430	99 8 8	3457	88 17 53	3440	77 23 2	3392	66 18 35	3312
3	119 32 48	3396	108 37 26	3442	97 46 56	3456	86 56 22	3437	76 0 36	3384	64 54 37	3300
6	118 10 27	3404	107 15 57	3446	96 25 43	3456	85 34 47	3439	74 38 1	3374	63 30 28	3287
9	116 48 15	3410	105 54 32	3449	95 4 30	3455	84 13 7	3436	73 15 15	3365	62 5 58	3274
12	115 26 10	3417	104 33 11	3451	93 43 15	3454	82 51 20	3421	71 52 19	3355	60 41 16	3261
15	114 4 13	3423	103 11 52	3454	92 21 59	3451	81 29 27	3415	70 29 11	3345	59 16 19	3248
18	112 42 22	3429	101 50 36	3155	91 0 40	3449	80 7 27	3408	69 5 52	3334	57 51 7	3233
21	111 20 38	3433	100 29 22	3455	89 39 19	3445	78 45 19	3400	67 42 20	3323	56 25 37	3220

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h.	OCT. 26. SUN E. ° ′ ″	P. L.	OCT. 27. SUN E. ° ′ ″	P. L.	NOV. 2. SUN W. ° ′ ″	P. L.	NOV. 3. SUN W. ° ′ ″	P. L.	NOV. 4. SUN W. ° ′ ″	P. L.	NOV. 5. SUN W. ° ′ ″	P. L.
0	54 59 51	3205	43 22 56	3081	33 15 14	2522	46 41 37	2519	60 6 19	2541	73 25 19	2582
3	53 33 48	3191	41 54 23	3065	34 55 57	2520	48 22 24	2521	61 46 35	2546	75 4 39	2588
6	52 7 28	3175	40 25 31	3048	36 36 43	2516	50 3 8	2522	63 26 44	2550	76 43 51	2594
9	50 40 49	3160	38 56 18	3032	38 17 31	2517	51 43 50	2525	65 6 48	2555	78 22 54	2601
12	49 13 52	3145	37 26 45	3016	39 58 26	2517	53 24 28	2528	66 46 45	2561	80 1 48	2607
15	47 46 37	3129	35 56 52	2999	41 39 10	2517	55 5 2	2530	68 26 34	2565	81 40 34	2614
18	46 19 2	3114	34 26 38	2983	43 20 0	2517	56 45 33	2534	70 6 17	2571	83 19 10	2620
21	44 51 9	3097	32 56 4	2966	45 0 49	2518	58 25 50	2538	71 45 52	2577	84 57 38	2627

h.	NOV. 6. SUN W. ° ′ ″	P. L.	NOV. 7. SUN W. ° ′ ″	P. L.	NOV. 8. SUN W. ° ′ ″	P. L.	NOV. 9. SUN W. ° ′ ″	P. L.	NOV. 10. JUPITER E. ° ′ ″	P. L.	NOV. 11. MARS W. ° ′ ″	P. L.
0	86 35 56	2634	99 36 37	2692	112 26 39	2753	125 5 40	2817	98 52 58	2524	42 12 43	2846
3	88 14 5	2641	101 13 28	2699	114 2 8	2761	126 39 4	2825	27 12 18	2534	43 46 11	2852
6	89 52 5	2648	102 50 9	2708	115 37 27	2769	128 13 41	2833	25 31 52	2545	45 19 32	2857
9	91 29 55	2655	104 26 39	2714	117 12 35	2777	129 47 26	2842	23 51 41	2556	46 52 46	2863
12	93 7 35	2663	106 3 0	2723	118 47 33	2785	131 20 59	2850	22 11 46	2569	48 25 52	2870
15	94 45 5	2669	107 39 10	2730	120 22 21	2793	132 54 22	2858	20 32 8	2583	49 58 50	2876
18	96 22 26	2677	109 15 10	2738	121 56 58	2802	134 27 35	2867	18 52 49	2599	51 31 40	2883
21	97 59 37	2685	110 50 59	2745	123 31 24	2809	136 0 36	2875	17 13 52	2616	53 4 20	2890

h.	NOV. 12. MARS W. ° ′ ″	P. L.	NOV. 13. MARS W. ° ′ ″	P. L.	NOV. 14. JUPITER W. ° ′ ″	P. L.	NOV. 15. JUPITER W. ° ′ ″	P. L.	NOV. 16. JUPITER W. ° ′ ″	P. L.	NOV. 17. SUN E. ° ′ ″	P. L.
0	54 36 52	2898	66 51 0	2465	23 41 57	2811	36 11 32	2871	48 30 17	2934	140 55 29	3407
3	56 9 14	2905	68 21 57	2974	25 16 11	2816	37 44 28	2878	50 1 53	2942	139 33 20	3414
6	57 41 26	2913	69 52 43	2983	26 50 18	2824	39 17 15	2887	51 33 19	2949	138 11 19	3419
9	59 13 28	2921	71 23 17	2992	28 24 14	2831	40 49 51	2895	53 4 36	2956	136 49 24	3425
12	60 45 20	2930	72 53 40	3001	29 58 2	2838	42 22 16	2903	54 35 44	963	135 27 36	3431
15	62 17 1	2938	74 23 52	3011	31 31 40	2847	43 54 31	2911	56 6 43	2970	134 5 54	3437
18	63 48 32	2947	75 53 51	3020	33 5 7	2854	45 26 30	2918	57 37 33	2976	132 44 19	3440
21	65 19 51	2955	77 23 39	3030	34 38 25	2863	46 58 32	2927	59 8 16	2983	131 22 48	3446

h.	NOV. 18. SUN E. ° ′ ″	P. L.	NOV. 19. SUN E. ° ′ ″	P. L.	NOV. 20. SUN E. ° ′ ″	P. L.	NOV. 21. SUN E. ° ′ ″	P. L.	NOV. 22. SUN E. ° ′ ″	P. L.	NOV. 23. SUN E. ° ′ ″	P. L.
0	130 1 23	3449	119 12 9	3468	108 23 44	3455	97 31 27	3412	86 30 16	3335	75 15 4	3227
3	128 40 2	3454	117 51 9	3468	107 2 30	3453	96 9 24	3403	85 6 45	3322	73 49 27	3210
6	127 18 46	3456	116 30 9	3468	105 41 13	3447	94 47 11	3396	83 42 59	3310	72 23 30	3195
9	125 57 33	3460	115 9 9	3466	104 19 50	3444	93 24 50	3386	82 18 59	3297	70 57 15	3179
12	124-36 24	3462	113 48 7	3466	102 58 23	3438	92 2 18	3377	80 54 44	3284	69 30 41	3162
15	123 15 17	3464	112 27 5	3463	101 36 49	432	90 39 35	336.	79 30 14	3271	68 3 46	3146
18	121 54 13	3465	111 6 0	3462	100 15 9	426	89 16 41	3357	78 5 28	3256	66 36 32	3129
21	120 33 10	3467	109 44 54	3459	98 53 22	3419	87 53 35	3345	76 40 25	3241	65 8 57	3110

h.	NOV. 24. SUN E. ° ′ ″	P. L.	NOV. 25. SUN E. ° ′ ″	P. L.	DEC. 1. SUN W. ° ′ ″	P. L.	DEC. 2. SUN W. ° ′ ″	P. L.	DEC 3. SUN W. ° ′ ″	P. L.	DEC. 4. SUN W. ° ′ ″	P. L.
0	63 41 0	3093	51 43 59	2944	28 6 48	2387	41 55 51	2422	55 34 53	2494	68 58 21	2589
3	62 12 42	3075	50 12 36	2924	29 50 42	2387	43 38 55	2423	57 16 15	2505	70 37 31	2602
6	60 44 2	3056	48 40 48	2905	31 34 35	2390	45 21 49	2437	58 57 22	2516	72 16 24	2615
9	59 14 59	3037	47 8 35	2886	33 18 24	2394	47 4 31	2445	60 38 13	2528	73 54 58	2628
12	57 45 34	3020	45 35 58	2866	35 2 7	2398	48 47 2	2454	62 18 48	2539	75 33 15	2641
15	56 15 46	3001	44 2 56	2848	36 45 45	2403	50 29 20	2463	63 59 7	2552	77 11 14	2655
18	54 45 34	2982	42 29 30	2828	38 29 15	2409	52 11 25	2473	65 39 8	2564	78 48 54	2669
21	53 14 59	2962	40 55 38	2809	40 12 37	2415	53 53 16	2483	67 18 53	2576	80 26 16	2682

h.	DEC. 5. SUN W. ° ′ ″	P. L.	DEC. 6. SUN W. ° ′ ″	P. L.	DEC. 7. SUN W. ° ′ ″	P. L.	DEC. 8. SUN W. ° ′ ″	P. L.	DEC. 9. MARS W. ° ′ ″	P. L.	DEC. 10. MARS W. ° ′ ″	P. L.
0	82 3 50	2696	94 48 56	2805	107 15 49	2909	119 25 26	3006	36 21 33	2978	48 22 57	3034
3	83 40 5	2707	96 23 18	2818	108 47 56	2923	120 55 31	3018	37 52 14	2985	49 52 28	3042
6	85 16 33	2723	97 57 22	2832	110 19 46	2935	122 25 21	3029	39 22 46	2991	51 21 49	3049
9	86 52 42	2737	99 31 8	2845	111 51 21	2947	123 54 58	3041	40 53 10	2998	52 51 1	3056
12	88 28 33	2751	101 4 38	2858	113 22 40	2959	125 24 29	3052	42 23 25	3005	54 20 4	3064
15	90 4 5	2764	102 37 51	2872	114 53 44	2971	126 53 29	3063	43 53 2	3013	55 48 58	3071
18	91 39 20	2778	104 10 46	2884	116 24 33	2983	128 22 24	3074	45 23 28	3019	57 17 43	3078
21	93 14 17	2792	105 43 26	2897	117 55 7	2995	129 51 6	3085	46 53 18	3027	58 46 19	3085

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	DEC. 11.			DEC. 12.			DEC. 13.			DEC. 14.			DEC. 15.			DEC. 16.		
	JUPITER W.			JUPITER W.			JUPITER W.			JUPITER W.			JUPITER W.			JUPITER W.		
h.	°	′	″	P. L.	°	′	″	P. L.	°	′	″	P. L.	°	′	″	P. L.	°	′	″	P. L.
0	22	37	35	2872	34	58	7	2913	47	11	3	2959	59	16	19	3002	71	14	49	3039	83	8	3	3065
3	24	10	30	2875	36	30	10	2918	48	42	7	2965	60	46	29	3008	72	44	13	3043	84	36	56	3067
6	25	43	21	2880	38	2	6	2924	50	13	4	2971	62	16	32	3013	74	13	33	3047	86	5	46	3069
9	27	16	5	2885	39	33	54	2930	51	43	53	2976	63	46	29	3018	75	42	48	3051	87	34	34	3070
12	28	48	43	2890	41	5	35	2936	53	14	36	2981	65	16	20	3022	77	11	58	3053	89	3	20	3072
15	30	21	15	2895	42	37	8	2942	54	45	12	2987	66	46	5	3026	78	41	5	3056	90	32	4	3073
18	31	53	40	2902	44	8	34	2948	56	15	41	2993	68	15	45	3030	80	10	8	3059	92	0	47	3074
21	33	25	57	2907	45	39	52	2954	57	46	3	2998	69	45	20	3035	81	39	7	3062	93	29	28	3074

	DEC. 17.				DEC. 18.				DEC. 19.				DEC. 20.				DEC. 21.				DEC. 22.			
	SUN E.				SUN E.				SUN E.				SUN E.				SUN E.				SUN E.			
0	139	8	44	3488	128	22	51	3472	117	33	5	3431	106	35	29	3364	95	25	31	3266	83	58	24	3142
3	137	48	6	3487	127	1	55	3468	116	11	24	3424	105	12	31	3352	94	0	40	3252	82	31	5	3124
6	136	27	27	3485	125	40	55	3463	114	49	35	3417	103	49	20	3342	92	35	32	3237	81	3	24	3106
9	135	6	46	3484	124	19	50	3460	113	27	38	3409	102	25	57	3331	91	10	7	3222	79	35	22	3088
12	133	46	4	3481	122	58	41	3455	112	5	32	3401	101	2	21	3318	89	44	24	3207	78	6	58	3069
15	132	25	19	3480	121	37	26	3449	110	43	17	3392	99	38	30	3307	88	18	23	3191	76	38	11	3052
18	131	4	33	3477	120	16	5	3444	109	20	51	3384	98	14	26	3293	86	52	3	3175	75	9	2	3033
21	129	43	43	3475	118	54	38	3439	107	58	16	3373	96	50	6	3280	85	25	24	3158	73	39	30	3013

	DEC. 23.				DEC. 24.				DEC. 25.				DEC. 26.				DEC. 30.				DEC. 31.			
	SUN E.				SUN E.				SUN E.				SUN E.				SUN W.				SUN W.			
0	72	9	33	2994	59	55	8	2835	47	12	59	2675	34	3	47	2538	22	32	50	2366	36	26	21	2403
3	70	39	13	2974	58	21	25	2813	45	35	45	2656	32	23	27	2524	24	17	13	2365	38	9	52	2414
6	69	8	28	2954	56	47	14	2794	43	58	6	2638	30	42	47	2512	26	1	38	2366	39	53	7	2425
9	67	37	18	2935	55	12	38	2772	42	20	2	2619	29	1	50	2500	27	46	2	2368	41	36	6	2436
12	66	5	44	2914	53	37	34	2753	40	41	33	2602	27	20	37	2490	29	30	23	2373	43	18	49	2449
15	64	33	43	2895	52	2	5	2733	39	2	41	2585	25	39	10	2482	31	14	37	2378	45	1	14	2463
18	63	1	18	2874	50	26	9	2714	37	23	25	2566	23	57	32	2477	32	58	43	2386	46	43	20	2477
21	61	28	26	2854	48	49	47	2694	35	43	47	2553	22	15	46	2474	34	42	38	2394	48	25	6	2490

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OBLIQUITY OF THE ECLIPTIC, &c.

1845.	Apparent Obliquity.	The Sun's Horizontal Parallax.	The Sun's Aberration	Equation of Equinoxes. In. Long.	Equation of Equinoxes. In A. R. (in time.	Mean Longitude of ☊'s Ascending Node.
	° ′ ″	″	″	″	s.	° ′
Jan. 1	23 27 29.56	8·72	—20.71	+16.03	+0.98	242 51.5
11	29.58	8·72	20.70	16.34	1.00	242 19.8
21	29.64	8·71	20.68	16.53	1.01	241 48.0
31	23 27 29.73	8·70	20.66	16.59	1.02	241 16.2
Feb. 10	29.84	8·69	20.62	16.49	1.01	240 44.5
20	29.92	8·67	20.58	16.24	0.99	240 12.7
Mar. 2	23 27 29.97	8·65	20.53	15.86	0.97	239 40.9
12	29.97	8·63	20.47	15.39	0.94	239 9.1
22	29.90	8·60	20.42	14.88	0.91	238 37.4
Apr. 1	23 27 29.77	8·58	20.36	14.38	0.88	238 5.6
11	29.59	8·55	20.30	13.94	0.85	237 33.8
21	29.35	8·53	20.24	13.59	0.83	237 2.0
May 1	23 27 29.09	8·51	20.19	13.37	0.82	236 30.3
11	28.82	8·49	20.14	13.30	0.81	235 58.5
21	28.57	8·47	20.10	13.36	0.82	235 26.7
31	23 27 28.35	8·46	20.07	13.54	0.83	234 55.0
Jun 10	28.17	8·45	20.05	13.81	0.85	234 23.2
20	28.05	8·44	20.03	14.12	0.86	233 51.4
30	23 27 27.99	8·44	20.02	14.44	0.88	233 19.6
July 10	27.99	8·44	20.03	14.72	0.90	232 47.9
20	28.04	8·45	20.04	14.91	0.91	232 16.1
30	23 27 28.12	8·45	20.06	14.99	0.92	231 44.3
Aug. 9	28.22	8·46	20.09	14.94	0.91	231 12.5
19	28.31	8·48	20.13	14.75	0.90	230 40.8
29	23 27 28.39	8·50	20.17	14.42	0.88	230 9.0
Sept. 8	28.42	8·52	20.22	13.99	0.86	229 37.2
18	28.40	8·54	20.28	13.48	0.82	229 5.5
28	23 27 28.32	8.57	20.34	12.95	0.79	228 33.7
Oct. 8	28.18	8·59	20.40	12.44	0.76	228 1.9
18	27.98	8·62	20.45	12.00	0.73	227 30.1
28	23 27 27.74	8·64	20.51	11.67	0.71	226 58.4
Nov. 7	27.48	8·66	20.56	11.49	0.70	226 26.6
17	27.22	8·68	20.61	11.45	0.70	225 54.8
27	23 27 26.98	8·70	20.65	11.56	0.71	225 23.0
Dec. 7	26.78	8·71	20.68	11.79	0.72	224 51.3
17	26.64	8·72	20.70	12.10	0.74	224 19.5
27	23 27 26.57	8·72	20.71	12.42	0.76	223 47.7
37	23 27 26.57	8·72	—20.71	+12.72	+0.78	223 15.9

Mean Obliquity, Jan. 1, 1845 = 23° 27′ 34″·24.

Daily Motion —3′·18

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JANUARY.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
	°	
1	♎ 9	☿ in ♑. 7 *Stars* in Mer. 8h. 5m. a.
2	♎ 23	☿ Stationary.
3	♏ 7	*Aldebaran* in Meridian 9h. 33m. a.
4	♏ 21	♂ ☌ ☽, ♂ 2° 3′ N.
5	♐ 6	*2d Sunday after Christmas.* ♀ ☌ ☽.
6	♐ 21	Epiphany. ☿ in Perihelion.
7	♑ 6	♃ greatest Hel. Lat. S.
8	♑ 21	☿ ☌ ☽; ☿ 2° 1′ S.
9	♒ 6	♄ ☌ ☽; ♄ 5° 30′ S.
10	♒ 20	7 *Stars* in Meridian 8h. 14m. a.
11	♓ 5	♀ ☌ e^2 Ophiuchi; ✱ 1° 46′ S.
12	♓ 18	*1st Sunday after Epiphany.*
13	♈ 2	♃ ☌ ☽; ♃ 6° 18′ S. ♅ ☌ ☽, ♅ 5° 33′ S.
14	♈ 14	☿ ☌ ♀; ☿ 6° 58′ N.
15	♈ 27	7 *Stars* in Meridian 7h. 57m. a.
16	♉ 9	☿ greatest Hel. Lat. N.
17	♉ 21	♂ ☌ λ Libræ ✱ 30′ S.
18	♊ 3	*Aldebaran* in Meridian 8h. 34m. a.
19	♊ 14	*Septuagesima Sunday.*
20	♊ 26	☉ ent. ♒. 7 *Stars* in Mer. 7h. 37m. a.
21	♋ 8	*Yd. L* in Meridian 9h. 19m. a.
22	♋ 20	♂ ☌ β^1 Scorpii; ✱ 29′ N. ☿ ☌ ♀.
23	♌ 2	☿ Stationary.
24	♌ 15	*Rigel* in Meridian 8h. 50m. a.
25	♌ 27	*Capella* in Meridian 8h. 44m. a.
26	♍ 10	*Sexagesima Sunday.*
27	♍ 23	*Sirius* in Meridian 10h. 9m. a.
28	♎ 6	*Rigel* in Meridian 8h. 34m. a.
29	♎ 20	♄ ☌ ☉. ☿ ☌ ♀; ☿ 24° 50′ S.
30	♏ 3	*Procyon* in Meridian 10h. 50 m. a.
31	♏ 17	♂ ☌ ω Ophiuchi; ✱ 1′ N.

FEBRUARY. [1845.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
	°	
1	♐ 1	♅ ☌ ψ^2 ♒; ✱ 57′ N. ♂ ☌ ☽; ♂ 5° S.
2	♐ 15	*Shrove Sunday* ♅ ☌ z^2 ♒, ✱ 25′ N.
3	♑ 0	♃ in Perihelion. [☿ ☌ ♀; ☿ 10° N.
4	♑ 15	♀ in ♑. ☿ ☌ ☽. ☿ gr. Elong. W.
5	♑ 29	*Ash Wednesday.*
6	♒ 14	♄ ☌ ☽; ♄ 5° 38′ S.
7	♒ 28	♃ ☌ ♅; ♅ 31′ N.
8	♓ 12	*Yd L* in Meridian 8h. 8m. a.
9	♓ 26	*1st Sunday in Lent.* ☿ in ♑.
10	♈ 9	♅ ☌ ☽; ♅ 5° 15′ S. ♃ ☌ ☽.
11	♈ 22	*Castor* in Meridian 9h. 57m. a.
12	♉ 5	☿ ☌ ☉; intens. of light 1.416.
13	♉ 17	♂ ☌ ♀; ♀ 4° 7′ S.
14	♉ 29	☿ ☌ ♀; ☿ 3°. 46′ N.
15	♊ 11	*Procyon* in Meridian 9h. 47m. a.
16	♊ 23	*2d Sunday in Lent.*
17	♋ 4	*Pollux* in Meridian 9h. 44m. a.
18	♋ 16	☉ enters ♓.
19	♋ 28	☿ in Aphelion.
20	♌ 11	*Castor* in Meridian 9h. 21m. a.
21	♌ 23	☿ ☌ ♀; ☿ 48′ S. ☿ ☌ ♄; ☿ 53′ S.
22	♍ 6	♀ ☌ ♄; ♀ 2′ S.
23	♍ 20	*3d Sunday in Lent.*
24	♎ 3	*Procyon* in Meridian 9h. 12m. a.
25	♎ 16	*Sirius* in Meridian 8h. 15m. a.
26	♏ 0	*Pollux* in Meridian 9h. 9m. a.
27	♏ 14	♂ ☌ D Ophiuchi; ✱ 1° 39′ N.
28	♏ 28	*Procyon* in Meridian 8h. 56m. a.

MARCH.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
	°	
1	♐ 12	*Castor* in Meridian 8h. 46m. a.
2	♐ 26	*4th Sun. in Lent.* ♂ ☌ ☽; ♂ 2° 16′ S.
3	♑ 10	♂ in ♑.
4	♑ 24	*Pollux* in Meridian 8h. 45m. a.
5	♒ 9	♂ ☌ 4 Sag. ✱ 20′ S. ♄ ☌ ☽; ♄ 5° 53′ S.
6	♒ 23	☿ ☌ ☽; ♀ 6° 35′ S.
7	♓ 7	☿ ☌ ☽; ☿ 7° 42′ S.
8	♓ 21	*Pollux* in Meridian 8h. 29m. a.
9	♈ 4	*5th Sunday in Lent.* ♅ ☌ ☽. ♃ ☌ ☽.
10	♈ 17	☉ in Aphelion.
11	♉ 0	☿ greatest Hel. Lat. S.
12	♉ 13	*Regulus* in Meridian 10h. 37m. a.
13	♉ 25	*Castor* in Meridian 7h. 59m. a.
14	♊ 7	*Procyon* in Meridian 7h. 59m. a.
15	♊ 19	♅ ☌ ♅. ♅ 4° 46′ S.
16	♋ 0	*Palm Sunday.*
17	♋ 12	St. Patrick.
18	♋ 24	*Regulus* in Meridian 10h. 13m. a.
19	♌ 6	β Leonis in Meridian 11h. 51m. a.
20	♌ 19	☉ enters ♈. *Spring begins.*
21	♍ 2	*Good Friday.*
22	♍ 15	☿ in Sup. ☌ ☉.
23	♍ 28	EASTER SUNDAY.
24	♎ 12	♀ ☌ ♀ Capricorni; ✱ 1° 20′ S. ☿ ☌ ♅.
25	♎ 26	Annunciation—Lady Day.
26	♏ 10	☿ Stationary. ♅ ☌ ☉.
27	♏ 24	♂ ☌ ♅; ♂ 4° 51′ N.
28	♐ 9	*Regulus* in Meridian 9h. 33m. a.
29	♐ 23	☿ ☌ ♃; ☿ 52′ N.
30	♑ 7	*Low Sunday.* ☿ in ♑. ♂ ☌ ☽.
31	♑ 21	β Leonis in Meridian 11h. 4m. a.

APRIL.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
	°	
1	♒ 5	♅ ☌ ☉.
2	♒ 19	♀ gr. Hel. Lat. S. ♄ ☌ ☽. ♄ 6° 10′ S.
3	♓ 3	*Regulus* in Meridian 9h. 10m. a.
4	♓ 16	☿ in Perihelion.
5	♈ 0	♀ ☌ κ ♑. ✱ 1° 27′ N. ♀ ☌ ☽. ♅ ☌ ☽.
6	♈ 13	*2d S. af. E.* ♀ ☌ ♅; ♅ 50′ N. ♃ ☌ ☉.
7	♈ 26	♅ gr. Hel. Lat. S. ☿ ☌ ☽; ☿ 22′ S.
8	♉ 8	β Leonis in Meridian 10h. 32m. a.
9	♉ 20	♂ □ ☉. *Regulus* in Mer. 8h. 47m. a.
10	♊ 3	γ Ursæ Majoris in Mer. 10h. 39m. a.
11	♊ 15	☿ ☌ ♃; ♅ 4° 20′ S.
12	♊ 28	β Leonis in Meridian 10h. 17m. a.
13	♋ 8	*3d Sunday after Easter.*
14	♋ 21	♀ greatest Hel. Lat. N.
15	♌ 2	β Corvi in Meridian 10h. 50m. a.
16	♌ 14	♀ ☌ ♃; ♀ 16′ S.
17	♌ 27	☿ gr. El. E. Fav. for obs. eve.
18	♍ 10	♀ ☌ ♅; ♅ 4° 6′ S.
19	♍ 23	β Leonis in Meridian 9h. 49m. a.
20	♎ 7	*4th Sunday after Easter.* ☉ ent. ♉.
21	♎ 21	*Spica* in Meridian 11h. 17m. a.
22	♏ 5	β Corvi in Meridian 10h. 22m. a.
23	♏ 19	St. George.
24	♐ 4	β Leonis in Meridian 9h. 29m. a.
25	♐ 19	*Spica* in Meridian 11h. 1m. a.
26	♑ 3	β Corvi in Meridian 10h. 6m. a.
27	♑ 18	*Rogation Sunday.*
28	♒ 2	☿ Stationary. ♂ ☌ ☽.
29	♒ 16	♄ ☌ ☽; ♄ 6° 25′ S.
30	♓ 0	β Leonis in Meridian 9h. 6m. a.

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MAY.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
1	♓ 13	β Corvi in Meridian 9h. 47m. a.
2	♓ 26	*Arcturus* in Meridian 11h. 24m. a.
3	♈ 9	♅ ☌ ☽; ♅ 4° 50′ S.
4	♈ 22	*Sunday after Ascension.* ♃ ☌ ☽.
5	♉ 4	*Spica* in Meridian 10h. 22m. a.
6	♉ 17	♀ ☌ ☽; ♀ 2° 3′ S. ☉ ecl. *visible.*
7	♉ 29	*Arcturus* in Meridian 11h. 4m. a.
8	♊ 11	☿ in ♉. ☿ trans. ☉. *vis.* ☿ Inf. ☌ ☉.
9	♊ 22	♄ □ ☉. ☿ ☌ ♀; ☿ 10′ N. ♂ ☌ ♀;
10	♋ 5	♂ ☌ ο Ω; ✱ 1° 56′ S. [♀ 34° 49′ N.
11	♋ 16	*Whit Sunday.*
12	♋ 28	☿ □ ☉.
13	Ω 10	*Spica* in Meridian 9h. 50m. a.
14	Ω 22	β Corvi in Meridian 8h. 56m. a.
15	♍ 5	*Arcturus* in Meridian 10h. 33m. a.
16	♍ 18	♀ in Sup. ☌ ☉.
17	♎ 1	*Spica* in Meridian 9h. 35m. a.
18	♎ 15	*Trinity Sunday.* ☿ in Aphelion.
19	♎ 29	α Cor. Bor. in Meridian 11h. 37m. a.
20	♏ 13	☿ Stationary.
21	♏ 28	☉ ent. ♊. ☽ eclipsed; *invisible.*
22	♐ 13	*Corpus Christi.* ♀ □ ☉.
23	♐ 27	α Serpentis in Meridian 11h. 30m. a.
24	♑ 13	α Cor. Bor. in Meridian 11h. 18m. a.
25	♑ 28	*1st Sunday after Trinity.*
26	♒ 12	♂ ☌ ☽; ♂ 8° 13′ S. ♄ ☌ ☽; ♄ 6° 31′ S.
27	♒ 26	♀ Stationary.
28	♓ 10	♀ in Ω.
29	♓ 23	♄ Stationary.
30	♈ 6	♅ ☌ ☽; ♅ 4° 46′ S.
31	♈ 19	α Serpentis in Meridian 10h. 59m. a.

JUNE.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
1	♉ 1	*2d Sun. after Trin.* ♃ ☌ ☽. ♂ ☌ ♄.
2	♉ 14	♀ ☌ ☽. ♇ ☌ μ Ceti; ✱ 20′ S.
3	♉ 26	*Arcturus* in Meridian 9h. 18m. a.
4	♊ 8	♀ gr. El. W. Fav. for obs. morn.
5	♊ 20	☌ ☌ α Leonis; ✱ 1° 3′ N. ♀ ☌ ☽.
6	♋ 1	α Cor. Bor. in Meridian 10h. 26m. a.
7	♋ 13	☿ greatest Hel. Lat. S.
8	♋ 25	*3d Sunday after Trinity.*
9	Ω 7	α Serpentis in Meridian 10h. 23m. a.
10	Ω 19	δ¹ Scorpii in Meridian 10h. 39m. a.
11	♍ 1	α Cor. Bor. in Meridian 10h. 7m. a.
12	♍ 14	*Antares* in Meridian 10h. 55m. a.
13	♍ 26	β Libræ in Meridian 9h. 40m. a.
14	♎ 9	α Serpentis in Meridian 10h. 4m. a.
15	♎ 23	*4th Sunday after Trinity.*
16	♏ 7	δ¹ Scorpii in Meridian 10h. 16m. a.
17	♏ 21	☌ ☌ ε Tauri; ✱ 45′ S. ♀ in Ω.
18	♐ 6	*Antares* in Meridian 10h. 31m. a.
19	♐ 21	α Lyræ in Meridian 0h. 39m. m.
20	♑ 7	*Altair* in Meridian 1h. 50m. m.
21	♑ 22	☉ enters ♋. *Summer begins.*
22	♒ 7	*5th Sunday after Trinity.*
23	♒ 21	♄ ☌ ☽; ♄ 6° 30′ S. ♂ ☌ ☽; ♂ 9° 59′ S.
24	♓ 6	St. John Baptist.—Midsum. Day.
25	♓ 20	♀ ☌ ρ Leonis; ✱ 9′ S.
26	♈ 3	☿ in Ω. ♅ ☌ ☽; ♅ 4° 38′ S.
27	♈ 16	*Antares* in Meridian 9h. 56m. a.
28	♈ 28	♃ ☌ ☽; ♃ 3° 2′ S.
29	♉ 11	*6th Sunday after Trinity.*
30	♉ 23	α Lyræ in Meridian 11h. 55m. a.

JULY.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
1	□ 5	♀ in Perihelion. ☿ in Perihelion.
2	□ 17	♅ □ ☉. ☉ furthest from the ⊕.
3	□ 28	*Antares* in Meridian 9h. 33m. a.
4	♋ 10	☿ ☌ ☽. α Lyræ in Mer. 11h. 41m. a.
5	♋ 22	♀ Stat. ☿ in Sup. ☌ ☉. ♀ ☌ ☽.
6	Ω 4	*7th Sunday after Trinity.*
7	Ω 16	*Antares* in Meridian 9h. 17m. a.
8	Ω 28	α Lyræ in Meridian 11h. 25m. a.
9	♍ 10	γ Draconis in Meridian 10h. 42m. a.
10	♍ 23	*Altair* in Meridian 0h. 39m. m.
11	♎ 6	☿ greatest Hel. Lat. N.
12	♎ 19	♀ in Aphelion.
13	♏ 2	*8th Sunday after Trinity.*
14	♏ 16	γ Draconis in Meridian 10h. 23m. a.
15	♐ 0	♅ Stationary.
16	♐ 15	α Lyræ in Meridian 10h. 53m. a.
17	♑ 0	*Altair* in Meridian 0h. 5m. m.
18	♑ 15	α Cygni in Meridian 0h. 54m. m.
19	♒ 0	γ Draconis in Meridian 10h. 20m. a.
20	♒ 15	*9th Sunday after Trinity.* ♄ ☌ ☽.
21	♓ 0	♂ Stationary. ♂ ☌ ☽.
22	♓ 14	α Lyræ in Meridian 10h. 30m. a.
23	♓ 28	☉ enters ♌. ♀ gr. Hel. Lat. N.
24	♈ 12	♅ ☌ ☽; ♅ 4° 25′ S.
25	♈ 25	♀ ☌ ♀; ♀ 17′ S.
26	♉ 7	♃ ☌ ☽; ♃ 2° 33′ S.
27	♉ 20	*10th Sunday after Trinity.*
28	□ 2	*Altair* in Meridian 11h. 18m. a.
29	□ 14	☿ ☌ α Leonis; ✱ 23′ S.
30	□ 25	♀ ☌ α Leonis; ✱ 1° 7′ S.
31	♋ 7	♀ ☌ ☉. intens. of light 0.311.

AUGUST.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
1	♋ 19	♃ □ ☉. α Lyræ in Mer. 9h. 50m. a.
2	Ω 1	γ Draconis in Meridian 9h. 8m. a.
3	Ω 13	*11th Sunday after Trinity.*
4	Ω 25	☿ in ♍. α Lyræ in Mer. 9h. 39m. a.
5	♍ 8	♀ ☌ ☽; ♀ 6° 46′ N. ☿ ☌ ☽; ☿ 4° 53′ N.
6	♍ 20	♇ ☌ δ² Tauri; ✱ 1° 45′ N.
7	♎ 3	♂ greatest Hel. Lat. S.
8	♎ 16	♄ ☌ ☉. ♇ ☌ κ Tauri; ✱ 1° 3′ S.
9	♎ 29	♇ ☌ δ¹ Tauri; ✱ 8′ N.
10	♏ 12	*12th Sunday after Trinity.*
11	♏ 26	α Lyræ in Meridian 9h. 11m. a.
12	♐ 10	*Altair* in Meridian 10h. 19m. a.
13	♐ 24	α Cygni in Meridian 11h. 7m. a.
14	♑ 8	♇ ☌ ρ ♀; ✱ 1° 7′ S. ☿ in Aphel.
15	♑ 24	♀ ☌ τ ♀; ✱ 1° 26′ N. ♀ gr. El. E.
16	♒ 9	♄ ☌ ☽; ♄ 6° 33′ S. [♇ ☌ α ♀; ✱ 30′ N.
17	♒ 24	*13th Sun. af. Trin.* ♀ in Aph. ♂ ☌ ☽.
18	♓ 8	♂ ♀ ☉. ♀ ☌ ♀; ♀ 3° 59′ S.
19	♓ 23	*Altair* in Meridian 9h. 51m. a.
20	♈ 7	♅ ☌ ☽; ♅ 4° 14′ S. [♀ 1° 2′ N.
21	♈ 20	♀ ♀ ☉. intens. of light 0.672. ♀ ☌ ♀;
22	♉ 3	♃ ☌ ☽; ♃ 2° 13′ S.
23	♉ 16	α Cygni in Meridian 10h. 28m. a.
24	♉ 28	*14th Sunday after Trinity.*
25	□ 10	*Altair* in Meridian 9h. 27m. a.
26	□ 22	*Fomalhaut* in Meridian 0h. 25m. m.
27	♋ 4	*Markab* in Meridian 0h. 29m. m.
28	♋ 16	☿ Stationary.
29	♋ 28	α Cygni in Meridian 10h. 4m. a.
30	Ω 10	♂ in Perihelion. ♃ Stationary.
31	Ω 22	*15th Sunday after Trinity.*

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SEPTEMBER.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
	°	
1	♏ 4	α Cygni in Meridian 9 h. 51 m. a.
2	♏ 17	*Fomalhaut* in Meridian 0h. 5m. m.
3	♎ 0	☿ ☌ ☽, ☿ 22′ S. ☿ greatest Hel.
4	♎ 12	♀ ☌ ☽, ♀ 3° 52′ N. [Lat. S.
5	♎ 25	♃ □ ☉.
6	♏ 9	*Markab* in Meridian 11h. 54m. a.
7	♏ 22	16*th Sunday after Trinity.*
8	♐ 6	α Cygni in Meridian 9h. 3m. a.
9	♐ 20	*Fomalhaut* in Meridian 11h. 34m. a.
10	♑ 4	*Markab* in Meridian 11h. 38m. a.
11	♑ 18	☿ in Inf. ☌ ☉.
12	♒ 3	♃ ☌ γ Orionis, ✱ 1° 2′ S.
13	♒ 18	♄ ☌ ☽, ♄ 6° 28′ S. ♂ ☌ ☽.
14	♓ 2	17*th Sunday after Trinity.*
15	♓ 17	α Cygni in Meridian 8 h. 58 m. a.
16	♈ 1	♅ ☌ ☽, ♅ 4° 10′ S.
17	♈ 15	♀ in ☍.
18	♈ 28	*Fomalhaut* in Meridian 10h. 58m. a.
19	♉ 11	♂ Stationary. ♃ ☌ ☽. [tionary.
20	♉ 24	♃ ☌ γ Orionis ✱ 49′ S. ☿ Sta-
21	♊ 6	18*th Sunday after Trinity.*
22	♊ 18	☉ ent. ♎. *Autumn begins.* ☿ in ♌.
23	♋ 0	♀ ☌ λ Virginis, ✱ 55′ N.
24	♋ 12	*Fomalhaut* in Meridian 10h. 35m. a.
25	♋ 24	*Markab* in Meridian 10h. 39m. a.
26	♌ 6	[gation W.
27	♌ 18	☿ in Perihelion. ☿ greatest elon-
28	♍ 0	19*th Sunday after Trinity.*
29	♍ 13	Michaelmas Day.
30	♍ 26	☿ ☌ ☽, ☿ 6° 16′ N.

OCTOBER. [1845.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
	°	
1	♎ 9	♅ ☍ ☉. ☿ favourable for obs. morn.
2	♎ 22	♀ ☌ ☉.
3	♏ 6	*Fomalhaut* in Meridian 9h. 59m. a.
4	♏ 19	♀ ☌ ☽. ♀ 59′ S.
5	♐ 3	20*th Sunday after Trinity.*
6	♐ 17	*Markab* in Merid. 9h. 52m. a.
7	♑ 1	☿ greatest Hel. Lat. N.
8	♑ 15	*Algenib* in Meridian 11h. 0m. a.
9	♒ 0	*Fomalhaut* in Meridian 9h. 36m. a.
10	♒ 13	♄ ☌ ☽, ♄ 6° 36′ S.
11	♒ 28	♀ ☌ α Libræ ✱ 1° 20′ N. ♂ ☌ ☽.
12	♓ 12	21*st Sunday after Trinity.*
13	♓ 26	♂ ☌ ♀, ♀ 10° 24′ S. ♃ Stationary.
14	♈ 10	♅ ☌ ☽, ♅ 4° 15′ S.
15	♈ 23	♀ Stationary.
16	♉ 6	☿ ☌ ♀, ☿ 2° 12 S. ♃ ☌ ☽. ♄ Stat.
17	♉ 19	♂ ☌ ι Aquarii, ✱ 1° 7′ N.
18	♊ 2	[uchi; ✱ Occulted.
19	♊ 14	22*d Sun. af. Trinity.* ♀ ☌ g′ Ophi-
20	♊ 26	α Andromeda in Merid. 10h. 4m. a.
21	♋ 8	♀ in Aphelion.
22	♋ 20	α Cassiop. in Meridian 10h. 27m. a.
23	♌ 2	☉ enters ♏.
24	♌ 14	β Ceti in Merid. 10h. 23m. a.
25	♌ 26	♀ □ ☉.
26	♍ 8	23*d Sun. af. Trin.* ☿ in Sup. ☌ ☉.
27	♍ 21	α Andromeda in Merid. 9h. 36m. a.
28	♎ 4	α Cassiop. in Meridian 10h 4m. a.
29	♎ 17	♃ ☍ ☉. ♀ ☌ A Oph., ✱ 1° 19′ S.
30	♏ 1	☉ eclipsed, *invisible.*
31	♏ 15	☿ ☌ ☽, ☿ 35′ N.

NOVEMBER.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
	°	
1	♏ 29	♀ ☌ ε Ophiuchi; ✱ 1° 37′ N.
2	♐ 13	24*th Sunday after Trinity.* ♀ ☌ ☽.
3	♐ 18	α Andromeda in Merid. 9h. 13m. a.
4	♑ 12	♄ □ ☉.
5	♑ 26	♃ ☌ γ Orionis; ✱ 20′ S.
6	♒ 11	♄ ☌ ☽; ♄ 6° 40′ S.
7	♒ 25	*Algenib* in Meridian 8h. 58m. a.
8	♓ 9	♂ ☌ ☽; ♂ 7° 19′ S.
9	♓ 22	25*th Sunday after Trinity.*
10	♈ 6	☿ in Aphelion. ♅ ☌ ☽; ♅ 4° 20′ S.
11	♈ 19	[♀ greatest Hel. Lat. S.
12	♉ 2	♃ ☌ γ Orionis; ✱ 28′ S. ♃ ☌ ☽.
13	♉ 15	☽ eclipsed, *visible.*
14	♉ 27	*Algenib* in Meridian 8h. 30m. a.
15	♊ 10	♂ ☌ λ Aquarii; ✱ 1° 15′ N.
16	♊ 22	26*th Sunday after Trinity.*
17	♋ 4	♀ □ ☉. ♀ ☌ σ Sagitt. ✱ 46′ S.
18	♋ 16	*Algenib* in Meridian 8h. 15m. a.
19	♋ 28	α Cassiop. in Meridian 8h. 37m. a.
20	♌ 10	7 *Stars* in Merid. 11h. 39m. a.
21	♌ 22	*Yd. L* in Meridian 1h. 25m. m.
22	♍ 4	☉ enters ♐.
23	♍ 16	27*th Sunday after Trinity.*
24	♍ 29	♃ ☌ o¹ Orionis; ✱ 1° 34′ S.
25	♎ 11	7 *Stars* in Meridian 11h. 20m. a.
26	♎ 25	♂ ☌ φ Aquarii; ✱ 3′ N.
27	♏ 9	*Yd. L* in Meridian 1h. 1m. m.
28	♏ 23	7 *Stars* in Meridian 11h. 8m. a.
29	♐ 7	[Hel. Lat. S.
30	♐ 22	1*st Sunday in Advent.* ☿ greatest

DECEMBER.

Day of Month.	Moon's Place.	Church Festivals, and Astronomical Phenomena.
	°	
1	♑ 7	♃ ☍ ☉; Intens. of light 0.619.
2	♑ 22	♀ ☌ ☽. ♀ 7° 43′ S.
3	♒ 7	♄ ☌ ☽; ♄ 6° 36′ S.
4	♒ 21	7 *Stars* in Meridian 10h. 44m. a.
5	♓ 5	*Yd. L* in Meridian 0h. 30m. m.
6	♓ 19	☿ ☌ λ Sagitt. ✱ 10′ N. ♂ ☌ ☽.
7	♈ 3	2*d Sunday in Advent.* ♅ ☌ ☽.
8	♈ 16	*Aldebaran* in Merid. 11h. 17m. a.
9	♈ 29	♃ ☌ ☽; ♃ 2° 46′ S. ♃ ☌ α; ✱ 38′ N.
10	♉ 11	☿ greatest Elongation E.
11	♉ 24	♃ in Aphelion.
12	♊ 6	♂ ☌ ♀; ♂ 1° 52′ N.
13	♊ 18	*Aldebaran* in Meridian 10h. 57m.
14	♋ 0	3*d Sunday in Advent.*
15	♋ 12	♂ ☌ η Capricor.; ✱ 54′ S. ♅ Stat.
16	♋ 24	7 *Stars* in Meridian 9h. 57m. a.
17	♌ 6	*Yd. L* in Meridian 11h. 39m. a.
18	♌ 18	☿ Stationary.
19	♍ 3	♀ gr. H. Lat. S. ☿ in ♌. ♀ ☌ ♄; ♀ 49′ S.
20	♍ 16	♀ gr. El. E. ☉ ent. ♑. *Winter beg.*
21	♍ 24	4*th Sunday in Advent.* St. Thomas;
22	♎ 7	7 *Stars* in Meridian 9h. 33m. a.
23	♎ 19	*Yd. L* in Meridian 11h. 15m. a.
24	♏ 3	☿ in Perihelion.
25	♏ 16	Christmas Day.
26	♐ 1	♃ Stationary.
27	♐ 15	☿ in Inf. ☌ ☉.
28	♑ 0	1*st Sunday after Christmas.* ☿ ☌ ☽.
29	♑ 15	7 *Stars* in Meridian 9h. 6m. a.
30	♒ 1	*Yd. L* in Meridian 10h. 47m. a.
31	♒ 16	♄ ☌ ☽; ♄ 6° 28′ S.

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ECLIPSES OF JUPITER'S SATELLITES, FOR THE YEAR 1845.

Date.	No. of Sat.	Greenwich Mean Time.	Date.	No. of Sat.	Greenwich Mean Time.	Date.	No. of Sat.	Greenwich Mean Time.
		h. m. s.			h. m. s.			h. m. s.
Jan.			July			Oct.		
1	2	Im. 14 19 29.3	15	1	Im. 23 59 7.7	8	1	Im. 22 45 57.7
1	2	Em. 16 49 49.3	17	1	Im. 18 27 32.4	10	1	Im. 17 14 32.7
2	1	Em. 9 34 10.9	19	2	Im. 15 44 17.9	12	1	Im. 11 43 14.1
7	1	Em. 17 1 10.0	19	2	Em. 18 11 50.0	12	2	Im. 23 4 57.1
9	1	Em. 11 30 4.0	21	3	Im. 16 24 32.4	15	3	Im. 16 35 13.0
12	2	Em. 8 44 15.9	21	3	Em. 18 41 7.7	16	1	Im. 0 40 31.4
16	3	Em. 10 22 29.8	24	1	Im. 20 21 11.3	16	2	Im. 12 22 54.4
16	1	Em. 13 25 53.9	26	2	Im. 18 21 34.1	17	1	Im. 19 9 8.2
19	2	Em. 11 20 40.4	26	2	Em. 20 49 0.2	19	1	Im. 13 37 52.1
23	3	Im. 11 42 57.5	28	3	Im. 20 24 52.5	22	3	Im. 20 36 58.3
23	3	Em. 14 24 7.6	28	3	Em. 22 40 38.2	23	2	Im. 14 59 6.1
23	1	Em. 15 21 30.6	31	1	Im. 22 14 50.4	24	1	Im. 21 3 53.2
25	1	Em. 9 50 37.6	Aug.			26	1	Im. 15 32 30.3
26	2	Em. 13 57 10.6	2	1	Im. 16 43 17.3	30	2	Em. 20 1 26.9
30	3	Im. 15 46 9.3	2	2	Im. 20 58 44.7	Nov.		
30	1	Em. 17 17 20.3	2	2	Em. 23 26 4.2	2	1	Em. 19 35 20.0
Feb.			5	3	Im. 0 25 19.2	4	1	Em. 14 4 4.0
1	1	Em. 11 46 16.8	9	1	Im. 18 36 57.9	6	2	Em. 22 37 30.9
2	2	Em. 16 33 46.1	9	2	Im. 23 35 48.3	9	1	Em. 21 30 27.3
8	1	Em. 13 41 50.6	13	2	Em. 15 21 1.2	10	2	Em. 11 55 35.5
15	1	Em. 15 37 18.7	16	1	Im. 20 30 40.5	11	1	Em. 15 59 13.4
17	1	Em. 10 6 7.6	18	1	Im. 14 59 5.1	13	1	Em. 10 28 4.4
20	2	Em. 11 5 47.8	20	2	Im. 15 30 47.1	13	3	Em. 10 46 57.8
24	1	Em. 12 1 27.7	20	2	Em. 17 57 50.5	16	1	Em. 23 25 43.7
27	2	Em. 13 42 45.2	23	1	Im. 22 24 25.7	17	2	Em. 14 31 36.9
28	3	Em. 10 32 29.3	25	1	Im. 16 52 51.0	18	1	Em. 17 54 32.1
Mar.			26	3	Em. 14 40 29.5	20	1	Em. 12 23 25.5
3	1	Em. 13 56 41.3	27	2	Im. 18 7 37.5	20	3	Im. 12 43 18.7
7	3	Em. 14 33 28.1	27	2	Em. 20 34 34.2	20	3	Em. 14 48 23.2
May			Sept.			24	2	Em. 17 7 36.5
6	2	Im. 0 8 44.6	1	1	Im. 18 46 40.8	25	1	Em. 19 49 59.3
7	1	Im. 23 28 44.7	2	3	Im. 16 29 2.1	27	1	Em. 14 18 54.8
11	3	Im. 0 14 57.5	2	3	Em. 18 40 50.6	27	3	Im. 16 45 58.8
16	1	Im. 19 51 28.8	3	1	Im. 13 15 9.6	27	3	Em. 18 50 35.7
23	1	Im. 21 45 34.8	3	2	Im. 20 44 21.0	Dec.		
30	2	Im. 21 21 17.4	8	1	Im. 20 40 35.2	1	2	Em. 19 43 33.5
30	1	Im. 23 39 35.5	9	3	Im. 20 29 39.6	2	1	Em. 21 45 34.4
June			9	3	Em. 22 40 44.3	4	1	Em. 16 14 32.1
1	1	Im. 18 8 4.3	10	1	Im. 15 9 5.6	4	3	Im. 20 48 15.0
6	2	Im. 23 59 0.8	10	2	Im. 23 20 58.7	4	3	Em. 22 52 26.7
8	3	Em. 18 41 22.1	14	2	Im. 12 39 33.9	6	1	Em. 10 43 23.3
8	1	Im. 20 1 59.2	15	1	Im. 22 34 35.7	8	2	Em. 22 19 33.8
15	3	Im. 20 20 5.6	17	3	Im. 0 30 13.5	9	1	Em. 23 41 16.4
15	1	Im. 21 55 49.7	17	1	Im. 17 3 7.8	11	1	Em. 18 10 15.5
15	3	Em. 22 41 6.7	19	1	Im. 11 31 37.1	12	3	Im. 0 50 47.9
22	1	Im. 23 49 36.9	21	2	Im. 15 16 1.6	12	2	Em. 11 37 33.4
23	3	Im 0 20 49.5	23	1	Im. 0 28 42.8	13	1	Em. 12 39 8.3
24	1	Im. 18 18 2.5	24	1	Im. 18 57 16.8	16	2	Em. 0 55 31.3
24	2	Im. 18 32 35.6	26	1	Im. 13 25 47.7	18	1	Em. 20 6 5.2
July			28	2	Im. 17 52 23.9	19	2	Em. 14 13 30.8
1	1	Im. 20 11 46.3	Oct.			20	1	Em. 14 34 59.4
1	2	Im. 21 10 9.4	1	3	Em. 10 41 8.6	25	1	Em. 22 1 59.5
1	2	Em. 23 37 57.4	1	1	Im. 20 51 33.1	26	3	Im. 8 54 59.4
8	1	Im. 22 5 27.8	3	1	Im. 15 20 5.9	26	3	Em. 10 58 4.9
8	2	Im. 23 47 40.0	5	2	Im. 20 28 42.5	26	2	Em. 16 49 27.8
10	1	Im. 16 33 52.7	8	3	Im. 12 33 48.0	27	1	Em. 16 30 54.5
12	2	Em. 15 34 34.3	8	3	Em. 14 42 10.5	29	1	Em. 10 59 57.5

The Immersion (Im.) denotes the instant of the disappearance of the Satellite, by entering into the shadow of Jupiter; and the Emersion (Em.) the instant of its re-appearance at coming out of the shadow. Before the Planet's opposition to the Sun. Oct. 29, the Immersions and the Emersions happen on the Western side, but after the opposition on the Eastern side of the Planet. With an inverting Telescope the appearances will be directly contrary. To find the time of Immersion or of Emersion for any place, we have only to subtract the longitude (in Time) from the Greenwich Mean Time of the phenomenon. It may then be ascertained whether the Planet be above the horizon at the time by applying its Semi-diurnal Arc, from p. 116, 117, to the time of its Meridian Passage, from page 64 or 65. It will also be necessary to consider if the Sun be below the horizon, as the Eclipses can be observed only in the absence of Sun-light.

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EPHEMERIS OF THE PRINCIPAL PLANETS.

Transit and Declination at Transit over the Meridian at Washington.

WASHINGTON MEAN TIME.

Date, 1845.	Mercury. Mer. Pass.	Mercury. Declination.	Venus. Mer. Pass.	Venus. Declination.	Mars. Mer. Pass.	Mars. Declination.	Jupiter. Mer. Pass.	Jupiter. Declination.	Saturn. Mer. Pass.	Saturn. Declination.	Uranus. Mer. Pass.	Uranus. Declination.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
Jan. 1	1 20	S. 20 2	21 44	S. 20 24	20 18	S. 16 30	5 6	S. 2 17	1 50	S. 19 17	5 24	N. 0 22
4	1 8	19 30	21 48	21 5	20 13	17 12	4 56	2 7	1 40	19 14	5 13	0 24
7	0 49	18 53	21 52	21 36	20 9	17 43	4 46	1 51	1 30	19 9	5 1	0 25
10	0 14	18 37	21 56	21 2	20 5	18 14	4 36	1 44	1 19	19 3	4 50	0 27
13	23 46	18 4	22 1	22 22	20 1	18 43	4 25	1 32	1 9	18 5	4 38	0 29
16	23 21	19 1	22 5	22 36	19 57	19 11	4 15	1 20	0 59	18 52	4 28	0 31
19	23 0	19 1	22 9	22 45	19 53	19 37	4 5	1 7	0 48	18 47	4 15	0 33
22	22 45	22 9	22 13	22 46	19 49	20 3	3 55	0 54	0 38	18 42	4 4	0 36
25	22 36	25 20	22 18	22 42	19 44	20 2	3 46	0 40	0 28	18 37	3 53	0 38
28	22 30	28 20	22 22	22 32	19 41	20 50	3 36	S. 0 26	0 17	18 31	3 41	0 41
Feb. 3	22 28	21 12	22 28	21 53	19 34	21 31	3 16	N. 0 3	23 53	18 18	3 18	0 47
6	22 30	21 11	22 35	21 24	19 30	21 49	3 7	0 18	23 43	18 13	3 7	0 50
9	22 33	21 0	22 34	20 50	19 26	22 7	2 57	0 3	23 32	18 6	2 56	0 54
12	22 37	20 3	22 42	20 10	19 22	22 22	2 48	0 4	23 22	18 1	2 44	0 57
15	22 43	20 7	22 46	19 25	19 19	22 31	2 38	1 4	23 12	17 54	2 33	1 0
18	22 48	19 2	22 50	18 34	19 15	22 41	2 29	1 21	23 1	17 50	2 22	1 4
21	22 54	18 26	22 53	17 39	19 12	23 0	2 19	1 37	22 51	17 4	2 11	1 8
24	23 1	17 18	22 56	16 40	19 8	23 10	2 10	1 52	22 40	17 38	1 59	1 11
27	23 8	15 53	22 59	15 36	19 4	23 18	2 1	2 8	22 30	17 33	1 48	1 15
Mar. 2	23 15	14 25	23 2	14 28	19 1	23 25	1 51	2 21	22 19	17 28	1 37	1 18
5	23 23	14 45	23 5	13 17	18 57	23 30	1 42	2 41	22 9	17 22	1 26	1 22
8	23 31	10 50	23 7	12 2	18 53	23 34	1 33	2 58	1 58	17 18	1 15	1 26
11	23 39	8 44	23 10	10 44	18 50	23 39	1 24	3 14	21 48	17 13	1 3	1 30
14	23 47	6 27	23 12	9 24	18 46	23 37	1 15	3 31	21 37	17 7	0 52	1 34
17	23 55	3 5	23 14	8 2	18 43	23 36	1 5	3 46	21 27	17 2	0 41	1 38
20	0 2	S. 2 15	23 16	6 37	18 39	23 34	0 56	4 5	21 16	16 57	0 30	1 43
23	0 12	N. 0 5	23 18	5 12	18 35	23 31	0 47	4 21	21 5	16 53	0 19	1 47
26	0 22	3 18	23 20	3 44	18 31	23 26	0 38	4 38	20 55	16 48	0 8	1 51
29	0 32	6 9	23 22	2 16	18 27	23 20	0 29	4 55	20 44	16 44	23 53	1 56
April 1	0 42	8 59	23 24	S. 0 47	18 23	23 13	0 20	5 12	20 33	16 40	23 41	2 0
4	0 50	11 40	23 26	N. 0 42	18 19	23 5	0 11	5 28	20 22	16 34	23 30	2 4
7	1 0	14 7	23 28	2 11	18 15	22 55	0 2	5 45	20 12	16 31	23 19	2 8
10	1 7	16 15	23 29	3 40	18 11	22 44	23 49	6 7	20 1	16 28	23 8	2 12
13	1 11	18 0	23 31	5 9	18 7	22 33	23 40	6 25	19 50	16 22	22 57	2 16
16	1 13	19 21	23 33	6 36	18 3	22 21	23 31	6 40	19 39	16 21	22 46	2 20
19	1 12	20 16	23 35	8 2	17 58	22 7	23 22	6 56	19 28	16 19	22 34	2 24
22	1 8	20 46	23 37	9 26	17 54	21 52	23 13	7 22	19 16	16 16	22 23	2 27
25	1 1	20 51	23 39	10 49	17 49	21 37	23 4	7 28	19 5	16 13	22 12	2 31
28	0 50	20 32	23 41	12 9	17 45	21 21	22 55	7 44	18 54	16 11	22 1	2 35
May 1	0 37	19 49	23 44	13 27	17 40	21 5	22 45	8 0	18 43	16 9	21 49	2 38
4	0 21	18 46	23 46	14 42	17 35	20 49	22 36	8 15	18 32	16 7	21 38	2 50
7	0 3	17 33	23 49	15 53	17 30	20 31	22 27	8 30	18 20	16 0	21 27	2 45
10	23 39	15 47	23 52	17 1	17 25	20 1	22 18	8 45	18 9	16 4	21 16	2 48
13	23 22	14 33	23 55	18 5	17 20	19 55	22 9	9 0	17 57	16 3	21 4	2 52
16	23 7	13 33	23 58	19 5	17 15	19 39	21 59	9 14	17 46	16 2	20 53	2 55
19	22 53	12 51	0 0	19 42	17 10	19 20	21 50	9 28	17 34	16 2	20 42	2 58
22	22 43	12 30	0 4	20 34	17 4	19 2	21 41	9 42	17 23	16 2	20 30	3 0
25	22 34	12 30	0 8	21 21	16 58	18 45	21 32	9 56	17 11	16 2	20 19	3 3
28	22 28	12 50	0 11	22 2	16 52	18 27	21 22	10 9	16 59	16 2	20 8	3 5
31	22 23	13 27	0 15	22 38	16 46	18 11	21 13	10 22	16 47	16 3	19 56	3 8
June 3	22 22	14 19	0 19	23 9	16 40	17 55	21 3	10 35	16 36	16 4	19 45	3 10
6	22 23	15 27	0 23	23 33	16 33	17 40	20 54	10 48	16 24	16 5	19 33	3 12
9	22 25	16 38	0 27	23 51	16 27	17 26	20 44	11 0	16 12	16 7	19 22	3 14
12	22 30	17 56	0 32	24 2	16 20	17 13	20 35	11 12	16 0	16 8	19 10	3 16
15	22 36	19 18	0 36	24 8	16 12	17 1	20 25	11 23	15 47	16 10	18 59	3 18
18	22 45	20 38	0 40	24 6	16 5	16 50	20 16	11 34	15 35	16 12	18 47	3 19
21	22 56	21 53	0 45	23 59	15 57	16 41	20 6	11 45	15 23	16 14	18 36	3 20
24	23 9	22 58	0 49	23 45	15 49	16 34	19 56	11 55	15 11	16 17	18 24	3 21
27	23 24	23 46	0 53	23 24	15 40	16 27	19 46	12 5	14 59	16 20	18 12	3 22
30	23 41	N. 24 13	0 57	N. 22 56	15 32	S. 16 24	19 36	N. 12 15	14 46	S. 16 22	18 1	N. 3 23

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Transit and Declination at Transit over the Meridian at Washington.

WASHINGTON MEAN TIME.

Date, 1845.	Mercury. Mer. Pass.	Mercury. Declination.	Venus. Mer. Pass.	Venus. Declination.	Mars. Mer. Pass.	Mars. Declination.	Jupiter. Mer. Pass.	Jupiter. Declination.	Saturn. Mer. Pass.	Saturn. Declination.	Uranus. Mer. Pass.	Uranus. Declination.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
July 3	23 57	N. 24 15	1 1	N. 22 25	15 23	S. 16 23	19 26	N. 12 23	14 34	S. 16 26	17 49	N. 3 24
6	0 8	24 2	1 5	21 46	15 13	16 23	19 16	12 32	14 21	16 29	17 37	3 24
9	0 24	23 23	1 9	21 2	15 5	16 25	19 6	12 40	14 9	16 33	17 26	3 25
12	0 39	22 22	1 12	20 12	14 53	16 30	18 56	12 48	13 57	16 37	17 14	3 25
15	0 53	21 14	1 15	19 18	14 42	16 36	18 46	12 55	13 44	16 41	17 2	3 25
18	1 4	19 31	1 18	18 19	14 31	16 46	18 36	13 3	13 32	16 44	16 50	3 25
21	1 15	17 46	1 21	17 15	14 19	16 57	18 25	13 9	13 19	16 49	16 38	3 24
24	1 23	15 58	1 24	16 6	14 7	17 10	18 15	13 15	13 6	16 53	16 27	3 24
27	1 30	14 3	1 27	14 54	13 54	17 25	18 5	13 21	12 54	16 57	16 15	3 23
30	1 36	12 5	1 29	13 38	13 41	17 41	17 54	13 26	12 41	17 2	16 3	3 22
Aug. 2	1 39	10 7	1 31	12 20	13 27	17 59	17 43	13 30	12 28	17 5	15 51	3 21
5	1 43	8 10	1 33	10 58	13 14	18 17	17 33	13 34	12 16	17 10	15 39	3 20
8	1 45	6 15	1 36	9 34	12 59	18 36	17 22	13 38	12 3	17 14	15 27	3 19
11	1 46	4 26	1 37	8 7	12 45	18 53	17 11	13 41	11 50	17 18	15 15	3 18
14	1 45	4 43	1 39	6 39	12 30	19 10	16 59	13 43	11 38	17 22	15 3	3 16
17	1 42	N 1 8	1 41	5 9	12 15	19 25	16 48	13 45	11 25	17 26	14 51	3 14
20	1 38	S. 0 16	1 42	3 38	12 0	19 39	16 37	13 47	11 12	17 30	14 39	3 12
23	1 32	1 25	1 44	2 6	11 45	19 50	16 25	13 48	11 0	17 34	14 27	3 10
26	1 24	2 16	1 45	N 0 33	11 31	20 0	16 14	13 48	10 47	17 38	14 16	3 8
29	1 13	2 45	1 46	S. 1 0	11 16	20 7	16 2	13 47	10 34	17 41	14 3	3 6
Sept. 1	0 59	2 45	1 48	2 34	11 2	20 10	15 50	13 47	10 22	17 45	13 50	3 3
4	0 42	2 13	1 49	4 6	10 47	20 11	15 38	13 45	10 9	17 48	13 38	3 1
7	0 22	S. 1 8	1 51	5 39	10 33	20 9	15 26	13 44	9 57	17 51	13 26	2 58
10	0 0	N 0 28	1 52	7 10	10 20	20 4	15 14	13 41	9 44	17 54	13 14	2 56
13	23 32	2 58	1 54	8 40	10 7	19 56	15 2	13 38	9 32	17 57	13 1	2 53
16	23 13	4 42	1 55	10 8	9 55	19 45	14 49	13 35	9 20	17 59	12 49	2 50
19	22 59	5 59	1 57	11 35	9 43	19 40	14 37	13 31	9 7	18 2	12 37	2 47
22	22 51	6 37	1 59	12 59	9 32	19 15	14 24	13 26	8 55	18 4	12 25	2 44
25	22 47	6 39	2 1	14 21	9 21	18 57	14 12	13 22	8 43	18 5	12 13	2 42
28	22 47	5 48	2 3	15 39	9 10	18 36	13 59	13 16	8 30	18 8	12 0	2 39
Oct. 1	22 51	4 31	2 5	16 55	9 0	18 14	13 46	13 10	8 18	18 9	11 48	2 36
4	22 56	2 49	2 8	18 7	8 50	17 47	13 33	13 4	8 6	18 10	11 36	2 33
7	23 3	N 0 51	2 10	19 14	8 41	17 20	13 20	12 58	7 54	18 10	11 24	2 31
10	23 10	S. 1 17	2 13	20 18	8 32	16 52	13 7	12 51	7 42	18 11	11 11	2 28
13	23 17	3 28	2 16	21 17	8 23	16 22	12 53	12 44	7 30	18 11	10 59	2 25
16	23 24	5 42	2 19	22 12	8 15	15 51	12 40	12 36	7 19	18 11	10 47	2 22
19	23 31	7 53	2 22	23 1	8 8	15 18	12 27	12 29	7 7	18 11	10 35	2 20
22	23 38	10 1	2 26	23 44	8 0	14 44	12 14	12 21	6 55	18 11	10 22	2 17
25	23 44	12 4	2 29	24 22	7 52	14 9	12 0	12 13	6 44	18 10	10 10	2 14
28	23 51	14 0	2 33	24 54	7 45	13 32	11 47	12 5	6 32	18 9	9 58	2 12
31	23 58	15 51	2 36	25 19	7 38	12 54	11 34	11 57	6 20	18 8	9 46	2 10
Nov. 3	0 1	17 1	2 40	25 39	7 31	12 16	11 20	11 50	6 9	18 6	9 34	2 8
6	0 8	18 38	2 44	25 52	7 24	11 36	11 7	11 42	5 57	18 4	9 22	2 5
9	0 16	20 8	2 48	25 58	7 18	10 55	10 53	11 35	5 46	18 2	9 10	2 4
12	0 23	21 28	2 51	25 58	7 12	10 14	10 40	11 28	5 35	18 0	8 58	2 2
15	0 30	22 39	2 55	25 53	7 5	9 31	10 26	11 20	5 24	17 58	8 45	2 1
18	0 38	23 40	2 58	25 39	6 59	8 48	10 13	11 14	5 12	17 55	8 33	1 59
21	0 46	24 30	3 2	25 20	6 53	8 4	10 0	11 7	5 1	17 52	8 21	1 57
24	0 53	25 9	3 5	24 55	6 48	7 19	9 47	11 2	4 50	17 49	8 9	1 56
27	1 1	25 35	3 8	24 24	6 42	6 34	9 34	10 56	4 39	17 45	7 57	1 55
30	1 8	25 49	3 10	23 45	6 35	5 49	9 22	10 52	4 28	17 42	7 46	1 54
Dec. 3	1 14	25 50	3 13	23 5	6 30	5 2	9 9	10 48	4 17	17 38	7 33	1 53
6	1 19	25 37	3 15	22 19	6 25	4 15	8 56	10 44	4 6	17 34	7 22	1 53
9	1 23	25 12	3 16	21 27	6 19	3 28	8 43	10 42	3 56	17 29	7 10	1 53
12	1 23	24 37	3 18	20 31	6 14	2 41	8 31	10 39	3 45	17 25	6 58	1 52
15	1 19	23 52	3 19	19 31	6 9	1 53	8 19	10 38	3 34	17 20	6 46	1 52
18	1 10	23 4	3 20	18 28	6 3	1 4	8 7	10 37	3 23	17 15	6 34	1 52
21	0 53	22 15	3 20	17 21	5 58	S. 0 16	7 55	10 36	3 13	17 10	6 23	1 53
24	0 29	21 31	3 19	16 13	5 53	N 0 32	7 43	10 36	3 2	17 5	6 11	1 54
27	0 1	20 52	3 19	15 0	5 48	1 20	7 31	10 37	3 51	17 0	5 59	1 54
30	23 24	S. 20 18	3 17	S. 13 46	5 43	N 2 8	7 19	N. 10 39	2 41	S. 16 54	5 47	N. 1 55

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GREENWICH SIDEREAL TIME AT GREENWICH MEAN NOON.

Day of month.	January.	February.	March.	April.	May.	June.
	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1	18 43.58.86	20 46 12.11	22 36 35.62	0 38 48.74	2 37 5.34	4 39 18.57
2	47 55.42	50 8.66	40 32.17	42 45.29	41 1.89	43 15.12
3	51 51.97	54 5.22	44 28.72	46 41.84	44 58.45	47 11.68
4	55 48.53	20 58 1.77	48 25.28	50 38.40	48 55.00	51 8.24
5	18 59 45.09	21 1 58.33	52 21.83	54 34.95	52 51.56	55 4.79
6	19 3 41.65	5 54.88	22 56 18 38	0 58 31.50	2 56 48.11	4 59 1.35
7	7 38.20	9 51.44	23 0 14.93	1 2 28.06	3 0 44.67	5 2 57.91
8	11 34.76	13 47.99	4 11.49	6 24.61	4 41.22	6 54.47
9	15 31.32	17 44.55	8 8.04	10 21.16	8 37.78	10 51 02
10	19 27.88	21 41.10	12 4.59	14 17.71	12 34.33	14 47.58
11	23 24.43	25 37.66	16 1.14	18 14.27	16 30.89	18 44.14
12	27 20.99	29 34.21	19 57.69	22 10.82	20 27.44	22 40.60
13	31 17.55	33 30.76	23 54.25	26 7.37	24 24.00	26 37.25
14	35 14.10	37 27.32	27 50.80	30 3.93	28 20 55	30 33.81
15	39 10.66	41 23.87	31 47.35	34 0.48	32 17.11	34 30.37
16	43 7.22	45 20.43	35 43.90	37 57.03	36 13.67	38 26.92
17	47 3.77	49 16.98	39 40.46	41 53.58	40 10.22	42 23.48
18	51 0.33	53 13.53	43 37.01	45 50.14	44 6.78	46 20.04
19	54 56.88	21 57 10.09	47 33.56	49 46.69	48 3.33	50 16.60
20	19 58 53.44	22 1 6.64	51 30.11	53 43.25	51 59.89	54 13.15
21	20 2 50.00	5 3.19	55 26.67	1 57 39.80	55 56.45	5 58 9.71
22	6 46.55	8 59.75	23 59 23.22	2 1 36.35	3 59 53.00	6 2 6.27
23	10 43.11	12 56 30	0 3 19.77	5 32.91	4 3 49.56	6 2.82
24	14 39.67	16 52.85	7 16.32	9 29.46	7 46.11	9 59.38
25	18 36.22	20 49.41	11 12.87	13 26.01	11 42.67	13 55.94
26	22 32.78	24 45.96	15 9.43	17 22.57	15 39.23	17 52.50
27	26 29.33	28 42.51	19 5.98	21 19.12	19 35.78	21 49 05
28	30 25.89	22 32 39.06	23 2.53	25 15.68	23 32.34	25 45.61
29	34 22.44		26 59.08	29 12.23	27 28.90	29 42.17
30	38 19.00		30 55.63	2 33 8.79	31 25.45	6 33 38.73
31	20 42 15.55		0 34 52 19		4 35 22.01	

Day of month.	July.	August.	September.	October.	November.	December.
	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1	6 27 35.28	8 39 48 53	10 42 1.70	12 40 18.27	14 42 31.41	16 40 48.08
2	41 31.84	43 45.09	45 58.26	44 14.82	46 27.97	44 44.63
3	45 28.40	47 41.64	49 54 81	48 11.38	50 24.52	48 41.19
4	49 24.95	51 38.20	53 51.36	52 7.93	54 21.08	52 37.75
5	53 21.51	55 34.75	10 57 47.91	12 56 4.48	14 58 17.63	16 56 34.30
6	6 57 18.07	5 59 31.31	11 1 44.47	13 0 1.03	15 2 14.19	17 0 30.86
7	7 1 14.62	9 3 27.86	5 41.02	3 57.59	6 10.74	4 27.42
8	5 11.18	7 24.41	9 37.57	7 54.14	10 7.30	8 23.98
9	9 7.74	11 20.97	13 34.12	11 50.69	14 3.85	12 20.53
10	13 4.30	15 17.52	17 30.68	15 47.24	18 0.40	16 17.09
11	17 0.85	19 14.08	21 27.23	19 43.80	21 56.96	20 13.65
12	20 57.41	23 10.63	25 23.78	23 40.35	25 53.51	24 10.20
13	24 53.97	27 7.19	29 20.33	27 36.90	29 50.07	28 6.76
14	28 50.52	31 3.74	33 16.89	31 33.45	33 46.62	32 3.32
15	32 47.08	35 0.30	37 13.44	35 30.01	37 43.18	35 59.88
16	36 43.64	38 56.85	41 9.99	39 26.56	41 39.74	39 56.43
17	40 40.19	42 53.40	45 6.54	43 23.11	45 36.29	43 52.99
18	44 36.75	46 49.96	49 3.09	47 19.66	49 32.85	47 49.55
19	48 33.30	50 46.51	52 59.65	51 16.22	53 29.40	51 46.11
20	52 29.86	54 43.07	11 56 56.20	55 12.77	15 57 25.96	55 42.66
21	7 56 26.42	9 58 39.62	12 0 52.75	13 59 9.32	16 1 22.51	17 59 39.22
22	8 0 22.97	10 2 36.17	4 49.30	14 3 5.88	5 19.07	18 3 35.78
23	4 19.53	6 32.73	8 45.85	7 2.43	9 15.63	7 32.34
24	8 16.09	10 29.28	12 42.41	10 58.98	13 12.18	11 28.89
25	12 12.64	14 25.83	16 38.96	14 55.54	17 8.74	15 25.45
26	16 9.20	18 22.39	20 35.51	18 52.09	21 5.30	19 22.01
27	20 5.75	22 18 94	24 32.06	22 48.64	25 1.85	23 18.56
28	24 2.31	26 15.49	28 28.62	26 45.20	28 58.41	27 15.12
29	27 58.86	30 12.04	32 25.17	30 41.75	32 54.96	31 11.68
30	31 55.42	34 8.60	12 36 21.72	34 38.30	16 36 51.52	35 8.24
31	8 35 51.97	10 38 5 15		14 38 34.86		18 39 4.79

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GREENWICH MEAN TIME OF GREENWICH SIDEREAL NOON.

Day of month.	January.	February.	March.	April.	May.	June.
	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1	5 15 9.37	3 13 16.14	1 23 10.72	23 17 21.71	21 19 24.49	19 17 31.98
2	11 13.46	9 20.23	19 14.81	13 25.80	15 28.58	13 35.37
3	7 17.55	5 24.33	15 18.91	9 29.90	11 32.67	9 39.46
4	5 3 21.64	3 1 28.42	11 23.00	5 33.99	7 36.76	5 43.55
5	4 59 25.72	2 57 32.51	7 27.09	23 1 38.08	21 3 40.85	19 1 47.64
6	55 29.81	53 36.60	1 3 31.19	22 57 42.18	20 59 44.94	18 57 51.73
7	51 33.90	49 40.69	0 59 35.28	53 46.27	55 49.03	53 55.82
8	47 37.99	45 44.78	55 39.37	49 50.36	51 53.13	49 59.91
9	43 42.08	41 48.87	51 43.47	45 54.46	47 57.22	46 4.00
10	39 46.17	37 52.96	47 47.36	41 58.55	44 1.31	42 8.09
11	35 50.26	33 57.06	43 51.65	38 2.64	40 5.40	38 12.17
12	31 54.35	30 1.15	39 55.75	34 6.73	36 9.49	34 16.26
13	27 58.44	26 5.24	35 59.84	30 10.83	32 13.58	30 20.35
14	24 2.52	22 9.33	32 3.93	26 14.92	28 17.67	26 24.44
15	20 6.61	18 13.42	28 8.03	22 19.01	24 21.76	22 28.53
16	16 10.70	14 17.52	24 12.12	18 23.11	20 25.85	18 32.62
17	12 14.79	10 21.61	20 16.22	14 27.20	16 29.94	14 36.70
18	8 18.88	6 25.70	16 20.31	10 31.29	12 34.03	10 40.79
19	4 22.97	2 2 29.79	12 24.40	6 35.38	8 38.12	6 44.88
20	4 0 27.06	1 58 33.88	8 28.50	22 2 39.48	4 42.21	18 2 48.97
21	3 56 31.15	54 37.98	0 4 32.59	21 58 43.57	20 0 46.30	17 58 53.06
22	52 35.24	50 42.07	{ 0 0 36.68 / 23 56 40.78 }	54 47.56	19 56 50.39	54 57.15
23	48 39.33	46 46.16	23 52 44.87	50 51.76	52 54.48	51 1.24
24	44 43.42	42 50.26	48 48.96	46 55.85	48 58.57	47 5.32
25	40 47.51	38 54.35	44 53.06	42 59.94	45 2.66	43 9.41
26	36 51.60	34 58.44	40 57.15	39 4.03	41 6.75	39 13.50
27	32 55.69	31 2.53	37 1.24	35 8.12	37 10.84	35 17.59
28	28 59.78	1 27 6.63	33 5.34	31 12.21	33 14.93	31 21.68
29	25 3.87		29 9.43	27 16.31	29 19.02	27 25.77
30	21 7.96		25 13.52	21 23 20.40	25 23.11	17 23 29.86
31	3 17 12.05		23 21 17.62		19 21 27.10	

Day of month.	July.	August.	September.	October.	November.	December.
	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
1	17 19 33.94	15 17 40.72	13 15 47.57	11 17 50.38	9 15 57.96	7 17 39.97
2	15 38.03	13 44.81	11 51.66	13 54 47	12 1.35	14 4.06
3	11 42.12	9 48.90	7 55.76	9 58.56	8 5.44	10 8.15
4	7 46.21	5 52.99	3 59.85	6 2.66	4 9.53	6 12.24
5	17 3 50.30	15 1 57.08	13 0 3.94	11 2 6.75	9 0 13.62	7 2 16.33
6	16 59 54.39	14 58 1.17	12 56 8.03	10 58 10.84	8 56 17.72	6 58 20.42
7	55 58.48	54 5.27	52 12.13	54 14.94	52 21.81	54 24.51
8	52 2.57	50 9.36	48 16.22	50 19.03	48 25.90	50 28.60
9	48 6.66	46 13.45	44 20.31	46 23.13	44 29.99	46 32.68
10	44 10.74	42 17.54	40 24.41	42 27.22	40 34.08	42 36.77
11	40 14.83	38 21.63	36 28.50	38 31.31	36 38.17	38 40.86
12	36 18.92	34 25.72	32 32.60	34 35.41	32 42.26	34 44.95
13	32 23.01	30 29.81	28 36.69	30 39.50	28 46.35	30 49.05
14	28 27.10	26 33.91	24 40.78	26 43.59	24 50.44	26 53.13
15	24 31.19	22 38.00	20 44.88	22 47.69	20 54.53	22 57.21
16	20 35.28	18 42.09	16 48.97	18 51.78	16 58.63	19 1.30
17	16 39.37	14 46.18	12 53.07	14 55.87	13 2.72	15 5.39
18	12 43.46	10 50.27	8 57.16	10 59.96	9 6.81	11 9.48
19	8 47.55	6 54.36	5 1.25	7 4.06	5 10.90	7 13.57
20	4 51.64	14 2 58.46	12 1 5.35	10 3 8.15	8 1 14.98	6 3 17.66
21	16 0 55.73	13 59 2.55	11 57 9.44	9 59 12.24	7 57 19.07	5 59 21.75
22	15 56 59.82	55 6.64	53 13.53	55 16.34	53 23.16	55 25.83
23	53 3.91	51 10.73	49 17.63	51 20.43	49 27.25	51 29.92
24	49 8.00	47 14.83	45 21.72	47 24.52	45 31.34	47 34.01
25	45 12.09	43 18.92	41 25.81	43 28.61	41 35.43	43 38.10
26	41 16.18	39 23.01	37 29.91	39 32.71	37 39.52	39 42.19
27	37 20.27	35 27.10	33 34.00	35 36.80	33 43.61	35 46.28
28	33 24.36	31 31.20	29 38.10	31 40.89	29 47.70	31 50.37
29	29 28.45	27 35.29	25 42.19	27 44.98	25 51.79	27 54.46
30	25 32.54	23 39.38	11 21 46.28	23 49.07	7 21 55.88	23 58.54
31	15 21 36.63	13 19 43.48		9 19 53.17		5 20 2.63

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APPARENT PLACES OF α URSÆ MINORIS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.	
	α Ursæ Minor. (*Polaris.*)		α Ursæ Minor. (*Polaris.*)		α Ursæ Minor. (*Polaris.*)		α Ursæ Minor. (*Polaris.*)		α Ursæ Minor (*Polaris.*)		α Ursæ Minor. (*Polaris.*)	
	h. m. s. *U* 1 3 0.33 *L* 13 1 2.37		h. m. s. *U* 1 3 0.33 *L* 13 1 2.37		h. m. s. *U* 1 3 0.33 *L* 13 1 2.37		h. m. s. *U* 1 3 0.33 *L* 13 1 2.37		h. m. s. *U* 1 3 0.33 *L* 13 1 2.37		h. m. s. *U* 1 3 0.33 *L* 13 1 2.37	
	R. A	Dec. N.	R. A.	Dec. N	R. A.	Dec. N	R. A.	Dec. N.	R. A.	Dec. N	R. A.	Dec. N.
	h. m. 1 3 s.	° ′ ″ 88 29 ″	h. m. 1 3 s.	° ′ ″ 88 29 ″	h. m. 1 3 s.	° ′ ″ 88 29 ″	h. m. 1 3 s.	° ′ ″ 88 28 ″	h. m. 1 3 s.	° ′ ″ 88 28 ″	h. m. 1 3 s.	° ′ ″ 88 28 ″
1	56.82	23.6	32.61	23.1	15.29	17.7	7.60	68.5	14.36	59.3	33.07	53.3
2	56.04	23.6	31.88	22.9	14.84	17.4	7.60	68.2	14.81	59.0	33.81	53.2
3	55.26	23.7	31.15	22.8	14.40	17.2	7.62	67.9	15.26	58.8	34.55	53.0
4	54.48	23.8	30.43	22.7	13.96	16.9	7.65	67.6	15.72	58.6	35.31	52.9
5	53.70	23.9	29.72	22.6	13.53	16.6	7.69	67.3	16.20	58.3	36.07	52.8
6	52.91	23.9	29.01	22.4	13.12	16.3	7.73	66.9	16.69	58.0	36.84	52.7
7	52.12	24.0	28.31	22.3	12.72	16.0	{7.79 / 7.86}	{66.6 / 66.3}	17.19	57.8	37.61	52.6
8	51.33	24.0	27.61	22.1	12.33	15.8	7.96	66.0	17.71	57.5	38.39	52.5
9	50.54	24.1	26.92	22.0	11.97	15.5	8.09	65.7	18.24	57.3	39.18	52.4
10	49.74	24.1	26.25	21.8	11.62	15.3	8.23	65.4	18.78	57.1	39.97	52.3
11	48.94	24.1	25.59	21.7	11.29	15.0	8.38	65.1	19.32	56.9	40.77	52.2
12	48.14	24.1	24.93	21.5	10.97	14.7	8.54	64.8	19.87	56.7	41.57	52.2
13	47.33	24.1	24.28	21.3	10.66	14.4	8.71	64.5	20.43	56.5	42.37	52.1
14	46.53	24.1	23.64	21.1	10.36	14.1	8.90	64.2	21.01	56.2	43.17	52.1
15	45.74	24.1	23.00	20.9	10.08	13.8	9.11	63.9	21.60	56.0	43.98	52.0
16	44.96	24.1	22.37	20.7	9.81	13.5	9.35	63.6	22.21	55.8	44.80	52.0
17	44.17	24.0	21.76	20.5	9.55	13.2	9.59	63.3	22.83	55.6	45.61	51.9
18	43.38	24.0	21.15	20.3	9.32	12.9	9.84	63.0	23.45	55.4	46.43	51.9
19	42.59	24.0	20.56	20.1	9.10	12.6	10.10	62.7	24.08	55.2	47.25	51.9
20	41.80	23.9	19.98	19.9	8.89	12.3	10.37	62.4	24.72	55.0	48.07	51.9
21	41.02	23.9	19.42	19.6	8.70	12.0	10.65	62.1	25.37	54.9	48.90	51.8
22	40.24	23.9	18.87	19.4	8.53	11.7	10.95	61.8	26.02	54.7	49.73	51.8
23	39.46	23.8	18.32	19.1	8.38	11.3	11.27	61.5	26.69	54.6	50.56	51.8
24	38.68	23.8	17.78	18.9	8.23	11.0	11.61	61.2	27.37	54.4	51.39	51.8
25	37.91	23.7	17.26	18.7	8.10	10.7	11.96	60.9	28.05	54.2	52.22	51.8
26	37.14	23.7	16.75	18.4	7.97	10.4	12.33	60.6	28.75	54.1	53.05	51.8
27	36.37	23.6	16.24	18.2	7.86	10.1	12.71	60.3	29.46	53.9	53.88	51.8
28	35.61	23.5	15.76	18.0	7.78	9.7	13.11	60.1	30.17	53.8	54.72	51.8
29	34.85	23.4	15.29	17.7	7.72	9.4	13.52	59.8	30.89	53.7	55.57	51.9
30	34.10	23.3			7.67	9.1	13.93	59.6	31.61	53.5	56.42	51.9
31	33.35	23.2			7.62	8.8	14.36	59.3	32.34	53.4	57.27	51.9
32	32.61	23.1			7.60	8.5			33.07	53.3		

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APPARENT PLACES OF α URSÆ MINORIS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	JULY.		AUGUST.		SEPTEM.		OCTOBER.		NOVEMBER		DECEMBER.	
	α Ursæ Minor. (*Polaris.*)		α Ursæ Minor. (*Polaris.*)		α Ursæ Minor. (*Polaris.*)		α Ursæ Minor. (*Polaris.*)		α Ursæ Minor. (*Polaris.*)		α Ursæ Minor. (*Polaris.*)	
	h. m. s.		h. m. s.		h. m. s.		h. m. s.		h. m. s.		h. m. s.	
	U 1 3 0.33		*U* 1 4 0.33		*U* 1 4 0.33		*U* 1 4 0.33		*U* 1 4 0.33		*U* 1 4 0.33	
	L 13 1 2.37		*L* 13 2 2.37		*L* 13 2 2.37		*L* 13 2 2.37		*L* 13 2 2.37		*L* 13 2 2.37	
	R. A.	Dec. N.	R. A.	Dec. N	R. A.	Dec. N	R. A.	Dec. N.	R. A.	Dec. N	R. A.	Dec. N.
	h. m.	° ′ ″	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
	1 3	88 28	1 4	88 28	1 4	88 29	1 4	88 29	1 4	88 29	1 4	88 29
	s.	″	s.	″	s.	″	s.	″	s.	″	s.	″
1	57.27	51.9	22.37	55.8	42.27	3.9	52.84	14.5	52.46	26.0	40.70	35.5
2	58.12	52.0	23.12	56.0	42.77	4.2	53.01	14.8	52.24	26.3	40.13	35.7
3	58.96	52.1	23.86	56.2	43.27	4.6	53.18	15.2	52.02	26.7	39.55	35.9
4	59.80	52.1	24.60	56.4	43.77	4.9	53.34	15.6	51.78	27.0	38.96	36.2
5	60.63	52.2	25.33	56.6	44.25	5.3	53.48	16.0	51.53	27.3	38.37	36.5
6	61.46	52.2	26.05	56.8	44.72	5.6	53.60	16.3	51.28	27.7	37.77	36.7
7	62.30	52.3	26.76	57.0	45.16	5.9	53.71	16.7	51.01	28.1	37.15	36.9
8	63.13	52.4	27.47	57.3	45.60	6.3	53.81	17.1	50.71	28.4	36.52	37.1
9	63.96	52.4	28.18	57.5	46.04	6.6	53.90	17.5	50.40	28.7	35.88	37.3
10	64.80	52.5	28.89	57.7	46.47	6.9	53.98	17.9	50.07	29.0	35.23	37.6
11	65.64	52.6	29.59	58.0	46.88	7.2	54.04	18.2	49.74	29.4	34.57	37.8
12	66.47	52.7	30.27	58.2	47.28	7.6	54.10	18.6	49.40	29.8	33.91	38.0
13	67.30	52.8	30.94	58.4	47.67	7.9	54.14	19.0	49.04	30.1	33.24	38.2
14	68.13	52.9	31.61	58.7	48.05	8.2	54.16	19.3	48.67	30.5	32.57	38.3
15	68.95	53.1	32.28	58.9	48.43	8.6	54.18	19.7	48.30	30.8	31.90	38.5
16	69.76	53.2	32.94	59.2	48.80	9.0	54.19	20.1	47.91	31.1	31.21	38.7
17	70.57	53.3	33.59	59.5	49.15	9.3	54.18	20.4	47.51	31.4	30.51	38.9
18	71.38	53.4	34.22	59.8	49.49	9.7	54.16	20.8	47.10	31.7	29.80	39.1
19	72.20	53.5	34.84	60.0	49.83	10.1	54.12	21.2	46.68	32.0	29.08	39.3
20	73.01	53.6	35.46	60.3	50.14	10.5	54.06	21.6	46.24	32.3	28.36	39.5
21	73.82	53.8	36.07	60.6	50.44	10.8	53.99	22.0	45.79	32.6	27.64	39.6
22	74.62	53.9	36.68	60.9	50.74	11.1	53.91	22.4	45.33	32.9	26.90	39.8
23	75.41	54.1	37.28	61.2	51.02	11.5	53.82	22.8	44.87	33.2	26.16	39.9
24	76.19	54.3	37.87	61.5	51.30	11.8	53.72	23.1	44.40	33.5	25.41	40.0
25	76.98	54.4	38.45	61.8	51.57	12.2	53.62	23.5	43.91	33.8	24.66	40.1
26	77.77	54.6	39.03	62.1	51.81	12.6	53.50	23.8	43.40	34.1	23.91	40.3
27	78.55	54.8	39.60	62.4	52.03	13.0	53.37	24.2	42.87	34.4	23.14	40.4
28	79.32	55.0	40.16	62.7	52.24	13.4	53.23	24.6	42.34	34.7	22.37	40.5
29	80.09	55.2	40.71	63.0	52.45	13.8	53.07	24.9	41.80	35.0	21.60	40.6
30	80.86	55.4	41.24	63.3	52.65	14.1	52.89	25.3	41.26	35.2	20.82	40.7
31	81.62	55.6	41.76	63.6			52.68	25.7			20.05	40.8
32	82.37	55.8	42.27	63.9	52.84	14.5	52.46	26.0	40.70	35.5	19.28	40.9

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	α Andromedæ. 1		γ Pegasi. 2. 3. (*Algenib.*)		ι Cassiopeæ. 3.		β Ceti. 2. 3.		θ1 Ceti. 3.	
	h. m. s. 23 59 10.67		h. m. s. 0 4 9.87		h. m. s. U 0 30 5.52 L 12 28 7.57		h. m. s. U 0 34 4.86		h. m. s. 1 14 58.23	
	R. A.	Dec N.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. S.
	h. m. 0 0	° ′ 28 14	h. m. 0 5	° ′ 14 19	h. m. 0 31	° ′ 55 41	h. m. 0 35	° ′ 18 49	h. m. 1 16	° ′ 8 58
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	24.06	19.8	16.45	27.5	46.37	32.8	49.15	81.3	17.81	65.1
11	23.92	18.8	16.34	26.6	46.09	32.2	49.02	81.7	17.68	65.8
21	23.79	17.5	16.22	25.6	45.81	31.1	48.89	82.0	17.55	66.4
31	23.67	16.1	16.12	24.5	45.55	29.6	48.77	81.9	17.42	66.7
Feb. 10	23.57	14.5	16.04	23.5	45.32	27.7	48.67	81.6	17.30	66.9
20	23.50	12.8	15.98	22.4	45.13	25.4	48.58	81.0	17.19	66.9
Mar. 2	23.47	11.2	15.95	21.5	44.99	23.0	48.52	80.2	17.09	66.6
12	23.46	9.6	15.95	20.7	44.90	20.4	48.48	79.1	17.02	66.1
22	23.51	8.2	15.99	20.1	44.88	17.9	48.48	77.7	16.99	65.4
Apr. 1	23.60	7.0	16.07	19.7	44.95	15.2	48.52	75.9	16.99	64.4
11	23.74	6.1	16.19	19.6	45.09	12.9	48.61	74.1	17.03	63.0
21	23.92	5.7	16.35	19.9	45.30	11.0	48.73	72.0	17.11	61.5
May 1	24.14	5.6	16.55	20.5	45.58	9.4	48.90	69.9	17.24	59.9
11	24.40	5.9	16.79	21.4	45.92	8.3	49.11	67.6	17.41	58.0
21	24.69	6.5	17.06	22.5	46.31	7.6	49.35	65.3	17.62	56.0
31	25.01	7.6	17.35	24.0	46.74	7.4	49.62	62.9	17.86	53.9
June 10	25.35	9.0	17.66	25.7	47.21	7.8	49.91	60.6	18.13	51.8
20	25.69	10.7	17.98	27.6	47.69	8.6	50.22	58.5	18.42	49.7
30	26.02	12.6	18.30	29.6	48.17	9.9	50.54	56.5	18.72	47.6
July 10	26.35	14.8	18.60	31.7	48.64	11.6	50.86	54.7	19.03	45.7
20	26.66	17.2	18.89	33.9	49.09	13.7	51.16	53.2	19.34	43.9
30	26.94	19.6	19.16	35.9	49.51	16.1	51.45	52.0	19.63	42.3
Aug. 9	27.19	22.1	19.40	38.0	49.89	18.8	51.72	51.1	19.91	41.0
19	27.40	24.6	19.61	39.9	50.23	21.7	51.95	50.6	20.16	40.1
29	27.58	27.0	19.78	41.7	50.52	24.8	52.15	50.5	20.38	39.4
Sept. 8	27.71	29.3	19.91	43.3	50.74	28.0	52.31	50.7	20.58	39.0
18	27.80	31.4	20.00	44.7	50.91	31.2	52.44	51.2	20.73	38.9
28	27.85	33.4	20.06	45.8	51.03	34.3	52.52	52.0	20.85	39.2
Oct. 8	27.87	35.1	20.08	46.8	51.08	37.4	52.56	53.1	20.94	39.7
18	27.85	36.6	20.07	47.5	51.09	40.3	52.57	54.3	21.00	40.4
28	27.79	37.9	20.03	48.0	51.04	43.0	52.55	55.6	21.02	41.3
Nov. 7	27.72	38.8	19.96	48.2	50.94	45.3	52.50	57.1	21.01	42.4
17	27.62	39.5	19.88	48.3	50.79	47.3	52.42	58.4	20.98	43.5
27	27.50	39.8	19.78	48.1	50.61	49.0	52.33	59.8	20.92	44.7
Dec. 7	27.37	39.8	19.67	47.8	50.39	50.1	52.22	61.0	20.84	45.8
17	27.23	39.5	19.55	47.2	50.14	50.8	52.09	62.0	20.75	46.8
27	27.09	38.9	19.43	46.5	49.87	51.0	51.96	62.9	20.64	47.8
37	26.94	38.0	19.30	45.6	49.58	50.7	51.83	63.5	20.51	48.6

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	α Arietis. 3.		γ Ceti. 3.		α Ceti. 2 3.		α Persei. 2. 3.		γ Tauri. 3.	
	h. m. s. 1 56 51.32		h. m. s. 2 33 45.29		h. m. s. 2 52 42.20		h. m. s. U 3 11 39.07 L 15 9 41.11		h. m. s. 3 36 34.07	
	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.
	h. m. s. 1 58	° ′ ″ 22 43	h. m. s. 2 35	° ′ ″ 2 34	h. m. s. 2 54	° ′ ″ 3 28	h. m. s. 3 13	° ′ ″ 49 18	h. m. s. 3 38	° ′ ″ 23 37
Jan. 1	28.51	45.6	18.17	46.8	12.70	42.0	20.04	26.8	19.07	20.4
11	28.38	45.2	18.07	46.0	12.60	41.2	19.88	27.6	19.00	20.3
21	28.24	44.6	17.94	45.3	12.48	40.5	19.68	28.1	18.88	20.2
31	28.09	43.9	17.80	44.7	12.34	39.9	19.45	28.2	18.74	19.9
Feb. 10	27.94	43.0	17.65	44.1	12.19	39.3	19.20	27.9	18.58	19.5
20	27.79	42.1	17.50	43.7	12.03	38.9	18.94	27.3	18.41	19.0
Mar. 2	27.66	41.1	17.36	43.4	11.88	38.6	18.69	26.3	18.23	18.5
12	27.55	40.1	17.24	43.3	11.75	38.4	18.45	25.0	18.06	17.8
22	27.47	39.2	17.13	43.3	11.63	38.4	18.24	23.5	17.90	17.1
Apr. 1	27.44	38.3	17.06	43.6	11.54	38.6	18.08	21.8	17.78	16.5
11	27.44	37.6	17.03	44.0	11.49	38.9	17.98	20.0	17.69	15.8
21	27.49	37.1	17.04	44.6	11.48	39.5	17.94	18.1	17.64	15.3
May 1	27.60	36.9	17.10	45.6	11.52	40.3	17.96	16.3	17.64	14.8
11	27.76	36.9	17.20	46.7	11.61	41.4	18.07	14.5	17.69	14.5
21	27.96	37.2	17.35	48.0	11.74	42.6	18.24	13.0	17.80	14.4
31	28.20	37.7	17.53	49.5	11.91	43.9	18.47	11.8	17.95	14.5
June 10	28.47	38.6	17.76	51.1	12.12	45.4	18.75	10.8	18.15	14.8
20	28.77	39.7	18.01	52.7	12.36	47.0	19.09	10.1	18.38	15.2
30	29.08	41.0	18.28	54.5	12.63	48.7	19.46	9.8	18.65	15.8
July 10	29.41	42.5	18.58	56.3	12.92	50.4	19.86	9.8	18.94	16.6
20	29.74	44.1	18.88	58.0	13.21	52.1	20.29	10.2	19.25	17.6
30	30.06	45.8	19.18	59.6	13.51	53.7	20.73	10.8	19.57	18.6
Aug. 9	30.37	47.6	19.48	61.1	13.81	55.1	21.16	11.8	19.89	19.7
19	30.66	49.3	19.76	62.4	14.10	56.4	21.59	13.0	20.21	20.8
29	30.93	51.1	20.03	63.5	14.37	57.5	22.00	14.4	20.52	21.9
Sept. 8	31.17	52.7	20.27	64.4	14.63	58.3	22.39	16.1	20.82	23.0
18	31.38	54.2	20.49	64.9	14.86	58.9	22.76	17.9	21.11	24.0
28	31.56	55.7	20.69	65.3	15.07	59.2	23.10	19.8	21.37	25.0
Oct. 8	31.70	56.9	20.85	65.3	15.26	59.3	23.40	21.8	21.61	25.8
18	31.82	58.0	20.99	65.1	15.41	59.1	23.66	23.9	21.83	26.6
28	31.90	59.0	21.10	64.8	15.54	58.8	23.88	26.0	22.02	27.2
Nov. 7	31.95	59.7	21.18	64.2	15.63	58.2	24.06	28.1	22.18	27.8
17	31.96	60.3	21.22	63.5	15.70	57.6	24.18	30.2	22.30	28.2
27	31.95	60.7	21.24	62.8	15.74	56.8	24.26	32.1	22.39	28.6
Dec. 7	31.91	60.9	21.23	61.9	15.74	56.0	24.28	33.8	22.45	28.9
17	31.84	60.9	21.19	61.1	15.71	55.1	24.25	35.4	22.47	29.1
27	31.74	60.8	21.12	60.2	15.66	54.3	24.17	36.7	22.44	29.2
37	31.63	60.4	21.02	59.4	15.57	53.5	24.03	37.7	22.38	29.2

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	γ¹ Eridani. 2. 3.		α Tauri. 1. (*Aldebaran.*)		α Aurigæ. 1. (*Capella.*)		β Orionis. 1 (*Rigel*)		β Tauri. 2.	
	h. m. s. 3 48 32.92		h. m. s. 4 25 26.98		h. m. s. U 5 3 20.72 L 17 1 22.76		h. m. s. 5 5 20.42		h. m. s. 5 14 18.88	
	R. A.	Dec. S.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. N.
	h. m. 3 59	° ′ 13 56	h. m. 4 27	° ′ 16 11	h. m. 5 5	° ′ 45 49	h. m. 5 7	° ′ 8 22	h. m. 5 16	° ′ 28 28
	s.	″	s.	″	s.	′	s.	″	s.	″
Jan. 1	49.84	77.6	4.28	33.3	18.16	63.7	7.67	73.7	32.55	12.5
11	49.76	79.1	4.24	33.0	18.14	65.0	7.64	75.4	32.56	12.8
21	49.65	80.3	4.16	32.7	18.06	66.1	7.58	76.8	32.51	13.1
31	49.50	81.3	4.05	32.3	17.92	67.0	7.48	78.0	32.42	13.4
Feb. 10	49.34	82.0	3.90	32.0	17.74	67.6	7.35	79.0	32.28	13.5
20	49.16	82.4	3.74	31.6	17.52	68.0	7.19	79.7	32.12	13.6
Mar. 2	48.98	82.5	3.56	31.3	17.27	68.1	7.01	80.2	31.93	13.5
12	48.80	82.3	3.38	30.9	17.01	67.9	6.82	80.4	31.73	13.4
22	48.64	81.9	3.21	30.6	16.76	67.4	6.64	80.3	31.53	13.1
Apr. 1	48.50	81.1	3.06	30.3	16.52	66.6	6.47	80.0	31.35	12.7
11	48.39	80.0	2.94	30.1	16.32	65.6	6.32	79.5	31.18	12.2
21	48.32	78.7	2.85	29.9	16.16	64.4	6.20	78.7	31.05	11.6
May 1	48.29	77.2	2.81	29.8	16.05	63.1	6.11	77.7	30.96	11.1
11	48.30	75.4	2.81	29.9	15.99	61.7	6.06	76.4	30.92	10.5
21	48.37	73.2	2.86	30.1	16.00	60.2	6.05	75.0	30.92	10.0
31	48.48	71.1	2.96	30.5	16.07	58.8	6.09	73.4	30.97	9.5
June 10	48.63	68.9	3.10	31.0	16.22	57.3	6.18	71.5	31.07	9.1
20	48.82	66.6	3.29	31.7	16.41	56.1	6.31	69.6	31.24	8.9
30	49.04	64.4	3.51	32.5	16.66	55.1	6.47	67.8	31.43	8.7
July 10	49.29	62.3	3.75	33.3	16.95	54.2	6.67	65.9	31.66	8.7
20	49.56	60.3	4.02	34.2	17.27	53.5	6.89	64.1	31.91	8.7
30	49.85	58.5	4.31	35.1	17.63	53.1	7.13	62.5	32.20	8.9
Aug. 9	50.14	57.0	4.61	36.1	18.01	52.8	7.39	61.0	32.50	9.1
19	50.43	55.9	4.91	37.0	18.40	52.7	7.67	59.8	32.81	9.3
29	50.72	55.0	5.21	37.8	18.80	52.8	7.95	58.9	33.14	9.7
Sept. 8	51.00	54.6	5.51	38.5	19.21	53.1	8.23	58.3	33.46	10.0
18	51.26	54.5	5.80	39.0	19.61	53.6	8.51	58.1	33.79	10.3
28	51.51	54.9	6.08	39.5	20.01	54.2	8.79	58.2	34.11	10.6
Oct. 8	51.73	55.6	6.34	39.8	20.39	55.0	9.05	58.7	34.42	10.9
18	51.93	56.7	6.58	39.9	20.76	55.9	9.30	59.6	34.72	11.2
28	52.10	58.1	6.81	40.0	21.10	56.9	9.54	60.7	35.01	11.5
Nov. 7	52.24	59.7	7.00	39.9	21.41	58.1	9.75	62.2	35.27	11.7
17	52.35	61.5	7.17	39.7	21.69	59.4	9.93	63.8	35.50	12.0
27	52.43	63.4	7.31	39.5	21.92	60.7	10.09	65.6	35.70	12.3
Dec. 7	52.48	65.3	7.41	39.2	22.10	62.1	10.21	67.5	35.87	12.6
17	52.48	67.2	7.47	38.9	22.23	63.5	10.29	69.3	35.99	13.0
27	52.45	68.9	7.49	38.6	22.30	64.9	10.33	71.1	36.07	13.3
37	52.38	70.5	7.47	38.2	22.30	66.3	10.33	72.8	36.10	13.7

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	δ Orionis. 2.		ε Orionis. 2. 3.		α Columbæ. 2.		α Orionis. 1.		μ Geminorum. 3.	
	h. m. s. 5 22 17.63		h. m. s. 5 26 16.94		h. m. s. 5 32 16.00		h. m. s. 5 44 13.92		h. m. s. 6 11 9.52	
	R. A.	Dec. S.	R. A.	Dec. S.	R. A.	Dec. S.	R. A.	Dec. N.	R. A.	Dec. N.
	h. m. 5 24	° ′ 0 25	h. m. 5 28	° ′ 1 18	h. m. 5 34	° ′ 34 9	h. m. 5 46	° ′ 7 22	h. m. 6 13	° ′ 22 35
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	7.62	13.2	23.28	25.8	4.59	47.8	49.31	15.9	37.60	8.8
11	7.62	14.5	23.28	27.1	4.55	50.5	49.33	15.0	37.66	8.8
21	7.58	15.6	23.24	28.3	4.47	53.0	49.31	14.2	37.67	8.8
31	7.50	16.6	23.16	29.3	4.33	55.1	49.25	13.5	37.63	8.9
Feb. 10	7.38	17.4	23.04	30.1	4.16	56.8	49.15	13.0	37.54	9.0
20	7.23	18.0	22.90	30.8	3.95	58.1	49.01	12.5	37.41	9.1
Mar. 2	7.06	18.5	22.73	31.2	3.72	59.0	48.85	12.2	37.25	9.2
12	6.88	18.7	22.55	31.5	3.48	59.4	48.67	12.0	37.07	9.2
22	6.70	18.8	22.37	31.6	3.23	59.3	48.49	11.9	36.88	9.2
Apr. 1	6.53	18.7	22.19	31.5	2.99	58.8	48.32	11.9	36.69	9.2
11	6.38	18.4	22.04	31.2	2.77	57.9	48.16	12.0	36.51	9.1
21	6.25	17.9	21.91	30.7	2.58	56.6	48.02	12.2	36.36	8.9
May 1	6.16	17.2	21.81	30.0	2.42	54.9	47.92	12.5	36.24	8.7
11	6.10	16.4	21.75	29.1	2.31	52.9	47.85	12.9	36.15	8.5
21	6.09	15.4	21.74	28.1	2.24	50.6	47.83	13.5	36.10	8.3
31	6.12	14.3	21.76	26.9	2.22	48.0	47.84	14.2	36.10	8.2
June 10	6.19	13.0	21.83	25.6	2.24	45.3	47.90	15.0	36.14	8.1
20	6.32	11.5	21.95	24.1	2.32	42.2	48.01	15.9	36.22	8.0
30	6.47	10.1	22.10	22.6	2.45	39.3	48.15	16.8	36.36	8.0
July 10	6.66	8.7	22.28	21.1	2.61	36.5	48.32	17.8	36.53	7.9
20	6.87	7.3	22.49	19.7	2.81	33.9	48.52	18.8	36.73	8.0
30	7.11	5.9	22.72	18.3	3.05	31.5	48.75	19.7	36.95	8.1
Aug. 9	7.36	4.7	22.98	17.1	3.31	29.3	49.00	20.6	37.20	8.1
19	7.63	3.7	23.24	16.1	3.59	27.6	49.26	21.3	37.47	8.2
29	7.91	2.9	23.52	15.3	3.89	26.3	49.54	21.9	37.76	8.2
Sept. 8	8.19	2.4	23.80	14.7	4.20	25.5	49.82	22.3	38.06	8.2
18	8.47	2.1	24.08	14.5	4.52	25.3	50.11	22.4	38.36	8.1
28	8.75	2.2	24.36	14.6	4.83	25.6	50.39	22.4	38.67	7.9
Oct. 8	9.02	2.5	24.63	14.9	5.14	26.4	50.68	22.1	38.99	7.7
18	9.28	3.1	24.90	15.6	5.43	27.8	50.96	21.6	39.30	7.4
28	9.53	4.0	25.15	16.5	5.70	29.7	51.22	21.0	39.60	7.0
Nov. 7	9.76	5.1	25.38	17.7	5.95	32.0	51.47	20.1	39.89	6.6
17	9.96	6.4	25.58	19.0	6.16	34.7	51.70	19.1	40.16	6.3
27	10.14	7.8	25.76	20.4	6.34	37.6	51.90	18.1	40.40	5.9
Dec. 7	10.28	9.3	25.91	22.0	6.48	40.6	52.07	17.0	40.62	5.6
17	10.39	10.7	26.02	23.5	6.56	43.7	52.21	16.0	40.79	5.4
27	10.45	12.1	26.09	25.0	6.60	46.7	52.30	15.0	40.92	5.2
37	10.47	13.4	26.11	26.4	6.59	49.5	52.35	14.0	41.01	5.2

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	51 (Hev.) Cephei. 6.		φ Canis Maj. 1. (*Sirius*)		ε Canis Maj. 2. 3		δ Geminor. 3. 4.		α² Geminor. 3. (*Castor*)	
	h. m. s. U 6 23 7.36 L 18 21 9.41		h. m. s. 6 36 5.47		h. m. s. 6 50 3.14		h. m. s. 7 8 0.14		h. m. s. 7 21 57.87	
	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. S.	R. A.	Dec. N.	R. A.	Dec. N.
	h. m. 6 25	° ′ 87 15	h. m. 6 38	° ′ 16 30	h. m. 6 52	° ′ 28 45	h. m. 7 10	° ′ 22 15	h. m. 7 24	° ′ 32 13
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	96.84	29.5	21.52	35.7	34.42	61.8	54.27	34.7	44.95	10.2
11	96.94	32.7	21.57	38.0	34.48	64.7	54.39	34.5	45.09	10.6
21	96.12	35.7	21.58	40.2	34.48	67.5	54.45	34.5	45.17	11.2
31	94.44	38.5	21.54	42.2	34.43	70.0	54.46	34.6	45.20	11.8
Feb. 10	91.96	41.1	21.45	43.9	34.33	72.2	54.42	34.7	45.17	12.5
20	88.78	43.2	21.32	45.2	34.19	74.0	54.34	35.0	45.09	13.2
Mar. 2	85.06	44.8	21.16	46.3	34.02	75.5	54.21	35.2	44.96	13.9
12	80.97	45.8	20.98	47.1	33.82	76.6	54.05	35.5	44.80	14.6
22	76.64	46.3	20.79	47.5	33.60	77.2	53.88	35.7	44.61	15.1
Apr. 1	72.30	46.2	20.59	47.6	33.38	77.5	53.69	35.8	44.41	15.5
11	68.09	45.4	20.40	47.4	33.16	77.3	53.51	36.1	44.20	15.7
21	64.16	44.2	20.23	46.9	32.96	76.7	53.34	36.1	44.01	15.6
May 1	60.72	42.4	20.08	46.1	32.78	75.8	53.19	36.2	43.84	15.6
11	57.80	40.1	19.96	45.0	32.62	74.5	53.06	36.1	43.70	15.4
21	55.57	37.5	19.87	43.6	32.50	72.9	52.97	36.0	43.59	15.0
31	54.08	34.7	19.83	42.1	32.43	71.0	52.93	35.9	43.52	14.5
June 10	53.32	31.6	19.82	40.3	32.39	68.9	52.92	35.8	43.49	13.9
20	53.37	28.5	19.85	38.4	32.39	66.5	52.94	35.7	43.51	13.2
30	54.33	25.0	19.92	36.5	32.43	64.1	53.01	35.5	43.56	12.4
July 10	56.01	22.0	20.03	34.3	32.52	61.3	53.13	35.4	43.66	11.7
20	58.40	19.0	20.18	32.3	32.65	58.8	53.27	35.2	43.82	10.8
30	61.46	16.3	20.35	30.4	32.81	56.5	53.45	35.0	44.00	10.0
Aug. 9	65.10	13.9	20.55	28.7	33.00	54.3	53.65	34.8	44.20	9.2
19	69.24	11.8	20.77	27.3	33.22	52.4	53.88	34.5	44.43	8.3
29	73.85	10.1	21.02	26.1	33.46	50.8	54.13	34.2	44.69	7.5
Sept. 8	78.80	8.7	21.28	25.3	33.73	49.6	54.40	33.8	44.98	6.6
18	83.95	7.9	21.55	24.9	34.02	49.0	54.68	33.3	45.28	5.8
28	89.26	7.4	21.83	25.0	34.32	48.8	54.98	32.7	45.60	4.9
Oct. 8	94.61	7.4	22.12	25.5	34.62	49.1	55.29	32.0	45.93	4.1
18	99.85	7.8	22.41	26.4	34.93	50.0	55.61	31.3	46.28	3.3
28	104.97	8.8	22.69	27.7	35.24	51.4	55.93	30.6	46.62	2.6
Nov. 7	109.73	10.3	22.96	29.4	35.53	53.3	56.24	29.8	46.97	1.9
17	114.05	12.2	23.22	31.4	35.80	55.5	56.54	29.0	47.31	1.4
27	117.90	14.5	23.45	33.7	36.05	58.1	56.83	28.3	47.63	1.0
Dec. 7	120.90	17.2	23.65	36.1	36.27	60.9	57.09	27.7	47.93	0.8
17	123.23	20.0	23.82	38.6	36.45	63.9	57.32	27.2	48.19	0.8
27	124.68	23.1	23.94	41.1	36.58	66.9	57.51	26.8	48.40	0.9
37	125.24	26.3	24.02	43.6	36.67	69.9	57.65	26.6	48.57	1.3

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	α Canis Min. 1.2. (*Procyon*)		β Geminor. 2. (*Pollux*)		Ursæ Maj. 3. 4.		α Hydræ. 2.		θ Ursæ Maj. 3.	
	h. m. s. 7 28 56.81		h. m. s. 7 32 56.05		h. m. s. U 8 45 44.13 L 20 43 46.18		h. m. s. 9 16 38.99		h. m. s. U 9 19 38.58 L 21 17 40.63	
	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. N.
	h. m. 7 31	° ′ 5 36	h. m. 7 35	° ′ 28 23	h. m. 8 48	° ′ 48 38	h. m. 9 19	° ′ 7 50	h. m. 9 22	° ′ 52 22
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	13.43	54.9	52.09	31.7	36.82	29.0	60.25	31.4	30.13	28.0
11	13.55	53.6	52.24	31.8	37.09	30.0	60.47	33.7	30.46	28.8
21	13.63	52.4	52.33	32.1	37.30	31.2	60.64	35.8	30.73	30.1
31	13.65	51.5	52.37	32.5	37.44	32.7	60.77	37.8	30.92	31.7
Feb. 10	13.63	50.7	52.35	33.1	37.51	34.4	60.84	39.5	31.04	33.5
20	13.56	50.1	52.28	33.6	37.50	36.2	60.87	41.0	31.08	35.4
Mar. 2	13.45	49.7	52.17	34.2	37.42	37.9	60.85	42.3	31.04	37.5
12	13.31	49.4	52.02	34.8	37.28	39.6	60.79	43.3	30.93	39.4
22	13.15	49.2	51.84	35.3	37.10	41.2	60.70	44.1	30.76	41.3
Apr. 1	12.98	49.2	51.65	35.7	36.88	42.5	60.58	44.6	30.55	43.0
11	12.81	49.3	51.46	36.0	36.63	43.5	60.44	44.9	30.31	44.4
21	12.65	49.6	51.27	36.1	36.38	44.3	60.30	44.9	30.04	45.5
May 1	12.50	49.9	51.10	36.1	36.13	44.7	60.15	44.7	29.76	46.2
11	12.37	50.3	50.96	36.0	35.89	44.7	60.01	44.4	29.49	46.5
21	12.28	50.7	50.85	35.8	35.67	44.4	59.88	43.8	29.24	46.4
31	12.21	51.3	50.77	35.5	35.49	43.8	59.77	43.1	29.02	46.0
June 10	12.18	51.9	50.74	35.1	35.35	42.9	59.67	42.3	28.83	45.2
20	12.19	52.6	50.74	34.6	35.25	41.7	59.60	41.3	28.67	44.1
30	12.23	53.3	50.78	34.1	35.20	40.2	59.55	40.2	28.56	42.6
July 10	12.30	54.1	50.87	33.5	35.19	38.6	59.52	39.1	28.49	40.9
20	12.41	54.9	51.00	32.9	35.22	36.8	59.52	37.9	28.47	39.0
30	12.55	55.5	51.16	32.3	35.31	34.8	59.55	36.7	28.50	36.9
Aug. 9	12.72	56.1	51.34	31.6	35.45	32.6	59.61	35.6	28.58	34.6
19	12.91	56.5	51.56	30.9	35.62	30.5	59.70	34.5	28.71	31.9
29	13.12	56.8	51.80	30.1	35.84	28.4	59.82	33.7	28.89	29.4
Sept. 8	13.36	56.9	52.07	29.3	36.10	26.3	59.96	33.1	29.11	26.9
18	13.61	56.7	52.35	28.5	36.39	24.2	60.13	32.7	29.38	24.4
28	13.88	56.4	52.65	27.6	36.72	22.2	60.34	32.7	29.69	22.0
Oct. 8	14.16	55.7	52.97	26.8	37.08	20.3	60.57	33.0	30.04	19.7
18	14.45	54.9	53.30	25.8	37.47	18.5	60.83	33.7	30.42	17.5
28	14.74	53.8	53.63	24.9	37.88	17.0	61.11	34.7	30.84	15.6
Nov. 7	15.04	52.5	53.97	24.1	38.31	15.7	61.41	36.0	31.29	13.9
17	15.33	51.1	54.30	23.4	38.75	14.7	61.72	37.7	31.75	12.5
27	15.60	49.6	54.61	22.7	39.19	14.1	62.03	39.6	32.22	11.5
Dec. 7	15.86	48.1	54.90	22.3	39.61	13.8	62.33	41.7	32.68	10.9
17	16.08	46.5	55.16	21.9	40.01	13.8	62.63	43.9	33.12	10.8
27	16.27	45.1	55.39	21.8	40.36	14.3	62.90	46.2	33.53	11 0
7	16.41	43.7	55.56	21.9	40.67	15.1	63.13	48.4	33 89	11.7

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	ε Leonis. 3.		α Leonis. 1 (*Regulus.*)		η Ursæ Maj. 1. 2.		δ Leonis. 3.		β Leonis. 2. 3.	
	h. m. s. 9 34 36.19		h. m. s. 9 57 32.41		U 10 51 23.57 L 22 40 25.61		h. m. s. 11 2 21.64		h. m. s. 11 38 15.86	
	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.
	h. m. 9 37	° ′ 21 28	h. m. 10 0	° ′ 12 42	h. m. 10 54	° ′ 62 24	h. m. 11 5	° ′ 21 21	h. m. 11 41	° ′ 15 25
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	4.73	50.5	8.72	67.5	8.93	46.8	52.90	63.7	10.29	64.5
11	4.99	49.9	8.98	66.1	9.46	47.2	53.20	62.5	10.60	62.9
21	5.21	49.5	9.20	65.0	9.93	48.2	53.48	61.5	10.89	61.5
31	5.37	49.4	9.37	64.1	10.32	49.7	53.72	60.9	11.15	60.5
Feb. 10	5.48	49.6	9.49	63.6	10.63	51.6	53.92	60.7	11.37	59.8
20	5.53	50.1	9.57	63.2	10.85	53.8	54.06	60.8	11.54	59.5
Mar. 2	5.54	50.7	9.60	63.2	10.97	56.3	54.16	61.2	11.67	59.5
12	5.49	51.5	9.58	63.3	11.00	58.9	54.21	61.8	11.75	59.8
22	5.41	52.3	9.52	63.6	10.93	61.6	54.21	62.7	11.79	60.3
Apr. 1	5.29	53.2	9.43	64.0	10.79	64.1	54.18	63.7	11.80	61.0
11	5.15	54.0	9.32	64.5	10.57	66.5	54.11	64.7	11.77	61.9
21	5.00	54.8	9.19	65.1	10.30	68.6	54.02	65.8	11.71	62.8
May 1	4.85	55.5	9.06	65.7	9.98	70.4	53.91	66.9	11.63	63.8
11	4.69	56.1	8.92	66.3	9.63	71.7	53.79	67.9	11.54	64.8
21	4.55	56.5	8.79	66.9	9.27	72.6	53.66	68.8	11.43	65.7
31	4 42	56.8	8.67	67.4	8.91	73.0	53.54	69.5	11.32	66.6
June 10	4.31	56.9	8.57	67.8	8.56	72.9	53.41	70.1	11.20	67.4
20	4.22	56.9	8.48	68.2	8.23	72.3	53.30	70.5	11.09	68.0
30	4.16	56.7	8.41	68.5	7.94	71.3	53.19	70.8	10.98	68.5
July 10	4.13	56.4	8.37	68.7	7.68	69.9	53.10	70.8	10.88	68.8
20	4.13	55.9	8.35	68.9	7.46	68.0	53.03	70.7	10.79	69.0
30	4.15	55.3	8.35	68.9	7.29	65.8	52.97	70.3	10.71	69.0
Aug. 9	4.20	54.5	8.38	68.8	7.18	63.3	52.93	69.8	10.64	68.8
19	4.30	53.5	8.43	68.5	7.12	60.5	52.92	69.0	10.60	68.4
29	4.41	52.4	8.52	68.1	7.13	57.4	52.93	68.0	10.58	67.8
Sept. 8	4.55	51.2	8.63	67.5	7.20	54.0	52.98	66.7	10.58	66.9
18	4.73	49.8	8.78	66.6	7.34	50.7	53.06	65.3	10.62	65.8
28	4.94	48.4	8.95	65.6	7.55	47.4	53.18	63.7	10.70	64.5
Oct. 8	5.18	46.8	9.16	64.4	7.83	44.2	53.33	62.0	10.81	63.0
18	5.45	45.1	9.40	63.0	8.17	41.0	53.52	60.0	10.96	61.3
28	5.74	43.3	9.67	61.4	8.58	38.1	53.75	57.9	11.15	59.4
Nov. 7	6.06	41.5	9.96	59.7	9.05	35.4	54.01	55.8	11.38	57.3
17	6.39	39.8	10.27	57.9	9.56	33.0	54.31	53.6	11.65	55.1
27	6.73	38.2	10.59	56.0	10.12	31.0	54.63	51.5	11.95	52.9
Dec. 7	7.07	36.7	10.92	54.2	10.70	29.5	54.96	49.4	12.26	50.7
17	7.40	35.4	11.24	52.4	11.29	28.6	55.30	47.5	12.59	48.6
27	7.71	34.3	11.54	50.8	11.86	28.2	55.63	45.8	12.92	46.6
37	7.99	33.6	11.81	49.3	12.41	28.3	55.95	44.4	13.24	44.9

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	γ Ursæ Maj. 2.		β Corvi. 2. 3.		12 Can. Ven. 2. 3.		α Virginis. 1. (Spica)		η Ursæ Maj. 2 3.	
	h. m. s. U 11 42 15.12 L 23 40 17.17		h. m. s. 12 23 8.47		h. m. s. U 12 45 4.79 L 0 47 2.74		h. m. s. 13 14 0.16		h. m. s. U 13 37 56.16 L 1 39 54.12	
	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. N.
	h. m. 11 45	° ′ 51 32	h. m. 12 26	° ′ 22 32	h. m. 12 48	° ′ 39 8	h. m. 13 17	° ′ 10 21	h. m. 13 41	° ′ 50 4
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	40.20	59.5	16.57	19.7	46.79	64.4	2.95	4.4	25.44	59.6
11	40.66	59.1	16.91	21.9	47.17	62.9	3.28	6.4	25.87	57.8
21	41.10	59.2	17.23	24.2	47.54	61.9	3.60	8.4	26.30	56.5
31	41.48	59.9	17.52	26.5	47.89	61.4	3.90	10.3	26.72	55.9
Feb. 10	41.81	61.1	17.78	28.8	48.20	61.5	4.18	12.1	27.11	55.9
20	42.07	62.7	18.00	31.0	48.47	62.1	4.43	13.7	27.47	56.5
Mar. 2	42.26	64.7	18.18	33.1	48.69	63.1	4.64	15.1	27.78	57.6
12	42.37	67.0	18.31	35.1	48.87	64.5	4.82	16.3	28.04	59.3
22	42.42	69.5	18.41	36.8	48.99	66.3	4.97	17.2	28.25	61.3
Apr. 1	42.39	72.1	18.46	38.3	49.06	68.3	5.07	18.0	28.40	63.7
11	42.39	74.6	18.49	39.6	49.08	70.5	5.15	18.5	28.49	66.3
21	42.16	77.0	18.48	40.6	49.07	72.7	5.19	18.8	28.52	69.0
May 1	41.97	79.1	18.45	41.4	49.01	74.9	5.21	18.9	28.51	71.8
11	41.75	81.0	18.39	42.0	48.92	77.0	5.20	18.9	28.44	74.4
21	41.51	82.4	18.32	42.4	48.81	78.9	5.17	18.7	28.33	76.9
31	41.26	83.5	18.23	42.5	48.67	80.5	5.12	18.4	28.19	79.1
June 10	40.99	84.2	18.13	42.4	48.52	81.8	5.05	18.0	28.01	81.0
20	40.74	84.4	18.02	42.0	48.36	82.8	4.97	17.6	27.81	82.6
30	40.48	84.1	17.90	41.5	48.19	83.5	4.87	17.0	27.58	83.7
July 10	40.25	83.4	17.78	40.8	48.01	83.8	4.77	16.4	27.34	84.4
20	40.04	82.3	17.66	39.9	47.84	83.7	4.65	15.7	27.09	84.6
30	39.85	80.8	17.55	38.9	47.68	83.2	4.54	15.0	26.84	84.4
Aug. 9	39.69	78.9	17.44	37.7	47.52	82.4	4.42	14.3	26.59	83.7
19	39.57	76.7	17.35	36.5	47.38	81.2	4.31	13.6	26.35	82.5
29	39.50	74.1	17.28	35.2	47.26	79.6	4.21	13.0	26.13	80.9
Sept. 8	39.47	71.3	17.24	34.0	47.17	77.7	4.13	12.4	25.94	78.9
18	39.49	68.0	17.23	32.9	47.12	75.5	4.07	12.0	25.78	76.6
28	39.57	64.8	17.26	31.8	47.10	73.0	4.05	11.7	25.66	73.9
Oct. 8	39.71	61.5	17.33	31.0	47.13	70.0	4.07	11.7	25.59	70.9
18	39.91	58.2	17.45	30.5	47.22	67.1	4.13	11.8	25.58	67.4
28	40.17	55.0	17.62	30.4	47.35	64.1	4.24	12.2	25.64	64.0
Nov. 7	40.49	51.9	17.83	30.6	47.53	61.0	4.40	12.9	25.76	60.5
17	40.86	49.0	18.09	31.1	47.77	58.0	4.60	13.9	25.94	57.0
27	41.27	46.4	18.38	32.1	48.05	55.0	4.84	15.2	26.19	53.6
Dec. 7	41.72	44.2	18.70	33.4	48.37	52.3	5.11	16.7	26.49	50.4
17	42.20	42.4	19.04	35.0	48.73	49.8	5.42	18.4	26.84	47.5
27	42.68	41.2	19.38	36.8	49.10	47.6	5.74	20.2	27.23	45.0
37	43.16	40.4	19.72	38.9	49.48	45.9	6.07	22.2	27.65	42.9

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	η Bootis. 3.		α Bootis. 1. (*Arcturus*)		ι Bootis. 3.		α² Libræ. 3.		β Ursæ Min. 3.	
	h. m. s. 13 43 55.20		h. m. s. 14 4 51.71		h. m. s. 14 34 46. 5		h. m. s. 14 38 46.18		h. m. s. U 14 47 44.73 L 2 49 2.68	
	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. N.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
	13 47	19 10	14 8	19 59	14 38	27 43	14 42	15 23	14 51	74 46
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	18.71	27.3	35.92	20.0	13.07	38.9	19.26	37.1	9.81	61.7
11	19.04	25.2	36.24	17.8	13.39	36.6	19.58	38.6	10.58	59.5
21	19.36	23.5	36.57	15.9	13.72	34.7	19.91	40.2	11.42	57.9
31	19.68	22.1	36.88	14.4	14.06	33.1	20.24	41.8	12.30	56.9
Feb. 10	19.98	21.1	37.19	13.3	14.38	32.1	20.55	43.3	13.18	56.6
20	20.25	20.6	37.47	12.7	14.69	31.6	20.85	44.7	14.04	57.0
Mar. 2	20.49	20.5	37.72	12.5	14.97	31.6	21.13	46.0	14.85	58.0
12	20.70	20.8	37.94	12.7	15.23	32.1	21.38	47.2	15.57	59.7
22	20.87	21.4	38.13	13.3	15.45	33.0	21.60	48.2	16.19	61.8
Apr. 1	21.00	22.4	38.28	14.3	15.63	34.3	21.80	49.0	16.69	64.4
11	21.10	23.7	38.40	15.5	15.78	36.0	21.96	49.6	17.05	67.4
21	21.16	25.1	38.48	17.0	15.89	37.9	22.10	50.0	17.27	70.5
May 1	21.19	26.7	38.53	18.6	15.97	40.0	22.20	50.3	17.35	73.7
11	21.19	28.3	38.55	20.2	16.01	42.1	22.28	50.4	17.28	76.9
21	21.16	29.9	38.54	21.9	16.02	44.3	22.33	50.5	17.07	80.0
31	21.12	31.4	38.50	23.5	16.00	46.4	22.35	50.4	16.74	82.9
June 10	21.04	32.8	38.44	25.0	15.95	48.3	22.34	50.2	16.30	85.4
20	20.95	34.1	38.35	26.4	15.87	50.1	22.30	50.0	15.75	87.6
30	20.85	35.2	38.25	27.5	15.77	51.6	22.24	49.6	15.11	89.4
July 10	20.73	36.0	38.13	28.4	15.64	52.9	22.16	49.2	14.41	90.6
20	20.59	36.6	37.99	29.1	15.49	53.8	22.05	48.8	13.65	91.4
30	20.46	37.0	37.85	29.6	15.33	54.4	21.92	48.3	12.86	91.6
Aug. 9	20.32	37.1	37.70	29.7	15.16	54.7	21.78	47.7	12.04	91.3
19	20.18	36.9	37.55	29.5	14.98	54.6	21.64	47.1	11.24	90.5
29	20.05	36.5	37.40	29.1	14.81	54.2	21.49	46.5	10.45	89.2
Sept. 8	19.93	35.8	37.27	28.4	14.64	53.4	21.35	45.9	9.70	87.4
18	19.84	34.7	37.16	27.4	14.50	52.3	21.23	45.4	9.00	85.1
28	19.78	33.4	37.07	26.0	14.37	50.8	21.13	44.9	8.39	82.4
Oct. 8	19.75	31.9	37.02	24.4	14.28	49.0	21.07	44.5	7.88	79.4
18	19.77	30.0	37.01	22.6	14.23	46.9	21.04	44.3	7.47	76.1
28	19.84	27.7	37.05	20.2	14.23	44.5	21.06	44.2	7.20	72.5
Nov. 7	19.95	25.4	37.14	17.8	14.28	41.6	21.14	44.4	7.07	68.4
17	20.11	23.0	37.27	15.3	14.39	38.8	21.27	44.9	7.10	64.6
27	20.31	20.5	37.46	12.7	14.54	35.9	21.44	45.5	7.29	60.9
Dec. 7	20.56	17.9	37.68	10.1	14.75	33.0	21.66	46.4	7.63	57.3
17	20.84	15.4	37.95	7.3	15.00	30.1	21.92	47.6	8.11	54.0
27	21.15	12.9	38.24	4.8	15.28	27.4	22.21	48.9	8.73	51.1
37	21.47	10.7	38.56	2.5	15.59	25.0	22.52	50.3	9.45	48.6

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	β Libræ. 2. 3.		α Coronæ Borealis. 2.		α Serpent. 2. 3.		β¹ Scorpii. 2.		δ Ophiuchi. 3.	
	h. m. s. 15 4 41.87		h. m. s. 15 24 38.68		h. m. s. 15 32 37.29		h. m. s. 15 52 34.04		h. m. s. 16 2 32.44	
	R. A.	Dec. S.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. S.
	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
	15 8	8 48	15 28	27 14	15 36	6 54	15 56	19 22	16 6	3 17
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	40.63	25.0	7.27	14.6	38.12	58.2	26.03	30.3	13.66	26.0
11	40.94	26.6	7.56	12.1	38.41	56.2	26.32	31.2	13.93	27.6
21	41.25	28.2	7.87	9.9	38.71	54.3	26.64	32.3	14.21	29.2
31	41.57	29.7	8.20	8.2	39.01	52.7	26.96	33.3	14.51	30.6
Feb. 10	41.88	31.1	8.52	6.8	39.31	51.3	27.28	34.4	14.82	31.8
20	42.18	32.4	8.84	6.0	39.61	50.2	27.60	35.5	15.12	32.9
Mar. 2	42.46	33.4	9.14	5.8	39.90	49.5	27.92	36.4	15.42	33.7
12	42.72	34.2	9.42	6.0	40.17	49.2	28.22	37.3	15.70	34.2
22	42.96	34.8	9.68	6.7	40.42	49.2	28.49	38.1	15.96	34.5
Apr. 1	43.17	35.2	9.91	7.9	40.64	49.5	28.75	38.7	16.21	34.5
11	43.35	35.4	10.10	9.4	40.84	50.2	28.99	39.2	16.43	34.3
21	43.51	35.4	10.26	11.3	41.01	51.1	29.20	39.5	16.63	33.8
May 1	43.63	35.2	10.39	13.4	41.15	52.2	29.38	39.8	16.80	33.2
11	43.73	34.9	10.49	15.6	41.26	53.5	29.53	39.9	16.95	32.4
21	43.80	34.5	10.55	17.9	41.35	54.9	29.65	40.0	17.07	31.5
31	43.84	34.0	10.58	20.2	41.40	56.3	29.75	40.1	17.16	30.6
June 10	43.86	33.5	10.57	22.4	41.43	57.7	29.81	40.0	17.22	29.6
20	43.84	32.9	10.53	24.5	41.42	59.0	29.83	40.0	17.25	28.7
30	43.79	32.3	10.45	26.3	41.38	60.3	29.82	39.8	17.24	27.7
July 10	43.72	31.8	10.35	27.9	41.32	61.4	29.78	39.7	17.20	26.9
20	43.62	31.2	10.22	29.3	41.23	62.4	29.70	39.5	17.13	26.1
30	43.51	30.6	10.07	30.3	41.11	63.2	29.59	39.2	17.03	25.4
Aug. 9	43.37	30.1	9.90	30.9	40.97	63.9	29.46	38.9	16.90	24.8
19	43.22	29.6	9.71	31.2	40.82	64.4	29.31	38.5	16.76	24.3
29	43.07	29.2	9.52	31.2	40.66	64.6	29.14	38.1	16.60	24.0
Sept. 8	42.93	28.8	9.33	30.8	40.50	64.7	28.97	37.7	16.43	23.7
18	42.79	28.5	9.14	30.0	40.34	64.5	28.81	37.2	16.27	23.5
28	42.67	28.3	8.98	28.9	40.20	64.1	28.66	36.7	16.12	23.6
Oct. 8	42.59	28.3	8.85	27.4	40.09	63.5	28.53	36.3	15.99	23.7
18	42.54	28.4	8.75	25.5	40.01	62.6	28.44	35.9	15.89	24.1
28	42.53	28.7	8.69	23.4	39.96	61.5	28.39	35.6	15.83	24.6
Nov. 7	42.57	29.2	8.68	20.9	39.97	60.1	28.39	35.4	15.81	25.4
17	42.67	30.0	8.73	18.0	40.03	58.3	28.43	35.4	15.84	26.3
27	42.81	31.0	8.83	15.2	40.13	56.5	28.55	35.6	15.93	27.6
Dec. 7	43.00	32.2	8.98	12.3	40.28	54.5	28.70	36.0	16.06	28.9
17	43.23	33.6	9.18	9.4	40.48	52.5	28.91	36.5	16.24	30.3
27	43.50	35.1	9.42	6.5	40.72	50.4	29.15	37.3	16.46	31. 9
37	43.79	36.6	9.70	3.9	40.98	48.3	29.43	38.2	16.71	33. 5

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	α Scorpii. 1. (*Antares*)		η Draconis. 3.		α Herculis. 3. 4.		β Draconis. 2.		α Ophiuchi. 2.	
	h. m. s. 16 15 30.20		h. m. s. U 16 17 29.88 L 4 19 27.83		h. m. s. 17 3 22.39		h. m. s. U 17 22 19.23 L 5 24 17.18		h. m. s. 17 23 19.08	
	R. A.	Dec. S.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.
	h. m.	° ′	h. m	° ′	h. m.	° ′	h. m.	° ′	h. m.	° ′
	16 19	26 4	16 21	61 51	17 7	14 34	17 26	52 24	17 27	12 40
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	54.82	50.9	52.00	49.3	34.47	16.6	54.40	63.5	44.02	40.5
11	55.11	51.4	52.35	46.2	34.68	14.4	54.61	60.2	44.21	38.4
21	55.43	52.0	52.77	43.5	34.92	12.3	54.88	57.1	44.44	36.4
31	55.76	52.7	53.23	41.3	35.19	10.4	55.20	54.4	44.69	34.6
Feb. 10	56.10	53.5	53.72	39.7	35.47	8.9	55.56	52.2	44.96	33.1
20	56.44	54.3	54.24	38.8	35.76	7.7	55.94	50.6	45.24	31.9
Mar. 2	56.77	55.1	54.75	38.5	36.05	6.9	56.34	49.5	45.53	31.1
12	57.09	55.9	55.25	38.9	36.34	6.5	56.75	49.1	45.82	30.7
22	57.39	56.7	55.72	40.0	36.63	6.6	57.16	49.4	46.11	30.7
Apr. 1	57.67	57.4	56.15	41.6	36.90	7.1	57.55	50.3	46.39	31.2
11	57.93	58.0	56.53	43.8	37.16	8.0	57.91	51.8	46.65	32.0
21	58.17	58.5	56.85	46.4	37.40	9.3	58.25	53.8	46.90	33.2
May 1	58.39	59.0	57.10	49.3	37.62	10.8	58.55	56.3	47.13	34.7
11	58.58	59.5	57.27	52.5	37.81	12.6	58.80	59.1	47.34	36.4
21	58.73	59.9	57.38	55.8	37.97	14.6	59.00	62.2	47.53	38.2
31	58.86	60.3	57.41	59.1	38.11	16.6	59.14	65.4	47.68	40.2
June 10	58.94	60.6	57.36	62.3	38.21	18.6	59.23	68.7	47.80	42.2
20	58.99	60.9	57.24	65.4	38.27	20.7	59.26	72.0	47.88	44.2
30	59.00	61.1	57.05	68.2	38.30	22.6	59.23	75.2	47.93	46.2
July 10	58.97	61.2	56.80	70.6	38.29	24.4	59.14	78.1	47.94	48.0
20	58.91	61.3	56.49	72.7	38.24	26.0	59.00	80.8	47.91	49.6
30	58.81	61.3	56.13	74.3	38.15	27.4	58.80	83.2	47.84	51.0
Aug. 9	58.67	61.3	55.73	75.5	38.03	28.6	58.55	85.2	47.74	52.2
19	58.52	61.1	55.29	76.1	37.89	29.5	58.27	86.7	47.60	53.2
29	58.34	60.8	54.84	76.3	37.72	30.1	57.95	87.8	47.44	53.9
Sept. 8	58.16	60.4	54.38	76.0	37.54	30.5	57.60	88.4	47.26	54.4
18	57.98	59.9	53.92	75.1	37.35	30.6	57.25	88.5	47.08	54.6
28	57.81	59.3	53.49	73.7	37.16	30.3	56.90	88.1	46.89	54.5
Oct. 8	57.66	58.7	53.09	71.8	36.99	29.8	56.56	87.2	46.71	54.1
18	57.54	58.1	52.73	69.5	36.84	29.0	56.24	85.8	46.55	53.4
28	57.47	57.5	52.44	66.8	36.71	27.9	55.96	83.9	46.41	52.4
Nov. 7	57.44	56.9	52.22	63.8	36.63	26.5	55.73	81.5	46.31	51.2
17	57.47	56.5	52.08	60.4	36.58	24.8	55.55	78.8	46.26	49.7
27	57.56	56.2	52.03	56.5	36.59	22.9	55.44	75.8	46.25	47.9
Dec. 7	57.70	56.0	52.08	52.8	36.64	20.8	55.40	72.5	46.28	46.0
17	57.89	56.1	52.22	49.1	36.76	18.3	55.44	68.7	46.38	43.7
27	58.13	56.3	52.46	45.6	36.91	16.0	55.55	65.2	46.51	41.5
37	58.40	56.7	52.77	42.3	37.10	13.7	55.72	61.7	46.68	39.4

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	γ Draconis. 2.		δ Ursæ Min. 3.		α Lyræ. 1. (*Vega.*)		β Lyræ. 2.		ζ Aquilæ. 3.	
	h. m. s. U 17 48 14.96 L 5 50 12.91		h. m. s. U 18 17 10.20 L 6 19 8.15		h. m. s. U 18 27 8.61 L 6 29 6.56		h. m. s. 18 40 6.53		h. m. s. 18 54 4.25	
	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. N.
	h. m. 17 52	° ′ 51 30	h. m. 18 21	° ′ 86 35	h. m. 18 31	° ′ 38 38	h. m. 18 44	° ′ 33 11	h. m. 18 58	° ′ 13 38
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	58.88	34.0	51.59	43.9	40.33	36.1	20.62	15.6	16.72	20.4
11	59.05	30.7	51.80	40.6	40.45	33.0	20.73	12.5	16.83	18.2
21	59.28	27.5	52.71	37.4	40.61	30.0	20.88	9.7	16.97	16.3
31	59.56	24.7	54.31	34.5	40.82	27.3	21.07	7.1	17.15	14.5
Feb. 10	59.89	22.3	56.54	31.9	41.07	24.9	21.30	4.8	17.36	12.9
20	60.25	20.4	59.27	29.8	41.35	23.0	21.55	2.9	17.59	11.6
Mar. 2	60.63	19.1	62.41	28.2	41.65	21.5	21.83	1.5	17.84	10.7
12	61.03	18.4	65.86	27.1	41.97	20.6	22.13	0.6	18.11	10.1
22	61.43	18.4	69.44	26.8	42.30	20.2	22.44	0.2	18.39	9.9
Apr. 1	61.82	19.0	73.04	27.0	42.63	20.5	22.76	0.4	18.67	10.2
11	62.20	20.3	76.51	27.9	42.96	21.4	23.08	1.1	18.96	10.9
21	62.55	22.1	79.72	29.3	43.28	22.8	23.39	2.4	19.25	12.0
May 1	62.87	24.4	82.61	31.3	43.59	24.6	23.69	4.1	19.53	13.4
11	63.15	27.1	85.02	33.6	43.87	26.9	23.97	6.3	19.80	15.1
21	63.39	30.1	86.89	36.4	44.12	29.6	24.22	8.8	20.05	17.1
31	63.57	33.3	88.20	39.4	44.34	32.5	24.44	11.5	20.27	19.2
June 10	63.70	36.6	88.88	42.6	44.51	35.5	24.63	14.4	20.47	21.4
20	63.77	39.9	88.93	45.9	44.64	38.6	24.78	17.4	20.64	23.7
30	63.78	43.2	88.34	49.2	44.72	41.7	24.88	20.4	20.77	25.9
July 10	63.73	46.3	87.15	52.3	44.76	44.7	24.93	23.3	20.86	28.1
20	63.62	49.2	85.36	55.4	44.74	47.6	24.94	26.0	20.90	30.1
30	63.46	51.8	83.03	58.2	44.67	50.3	24.90	28.6	20.91	31.9
Aug. 9	63.24	54.0	80.22	60.7	44.56	52.6	24.81	30.9	20.87	33.5
19	62.98	55.9	76.97	62.9	44.40	54.7	24.68	32.9	20.79	35.0
29	62.68	57.3	73.36	64.6	44.21	56.3	24.52	34.5	20.67	36.2
Sept. 8	62.35	58.2	69.49	66.0	43.98	57.6	24.32	35.8	20.52	37.1
18	62.01	58.7	65.40	66.9	43.73	58.4	24.10	36.7	20.35	37.7
28	61.66	58.6	61.21	67.3	43.47	58.8	23.87	37.2	20.17	38.0
Oct. 8	61.32	58.0	56.99	67.2	43.22	58.7	23.63	37.2	19.98	38.1
18	61.00	57.0	52.85	66.5	42.97	58.2	23.40	36.8	19.79	37.8
28	60.71	55.4	48.89	65.5	42.73	57.2	23.18	36.0	19.62	37.3
Nov. 7	60.46	53.3	45.21	63.9	42.52	55.7	22.99	34.7	19.47	36.4
17	60.26	50.9	41.88	61.8	42.35	53.8	22.83	33.0	19.35	35.3
27	60.12	48.1	39.04	59.4	42.23	51.5	22.72	31.0	19.26	33.9
Dec. 7	60.04	44.9	36.74	56.6	42.16	48.9	22.65	28.6	19.22	32.3
17	63.03	41.6	35.13	53.6	42.14	46.1	22.63	26.0	19.22	30.5
27	69.10	37.8	34.09	49.9	42.17	43.1	22.66	23.2	19.26	28.6
37	60.24	34.4	33.90	47.6	42.27	39.6	22.74	20.3	19.34	26.4

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	γ Aquilæ. 3.		α Aquilæ 1. 2. (*Altair.*)		α2. Capri. 3.		α Cygni. 1.		ζ Cygni. 3.	
	h. m. s. 19 32 57.60		h. m. s. 19 38 56.89		h. m. s. 20 4 52.59		h. m. s. U 20 31 48.22 L 8 33 46.17		h. m. s. 21 1 43.27	
	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. N.	R. A.	Dec. N.
	h. m. 19 38	° ′ 10 14	h. m 19 43	° ′ 8 27	h. m. 20 9	° ′ 13 0	h. m. 20 36	° ′ 44 43	h. m. 21 6	° ′ 29 35
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	53.03	29.4	12.83	51.8	26.72	70.8	8.14	58.2	20.21	50.9
11	53.09	27.7	12.89	50.3	26.77	71.1	8.09	55.5	20.17	48.7
21	53.21	25.9	13.00	48.5	26.86	71.3	8.09	52.6	20.17	46.4
31	53.35	24.3	13.14	47.1	27.00	71.5	8.15	49.3	20.20	44.1
Feb. 10	53.52	22.9	13.31	45.8	27.15	71.5	8.26	46.5	20.28	41.6
20	53.72	21.7	13.51	44.7	27.34	71.4	8.42	43.8	20.40	39.5
Mar. 2	53.94	20.9	13.73	43.9	27.55	71.1	8.62	41.5	20.55	37.7
12	54.19	20.4	13.97	43.5	27.78	70.7	8.87	39.6	20.74	36.2
22	54.45	20.2	14.23	43.4	28.04	70.0	9.16	38.2	20.97	35.2
Apr. 1	54.72	20.5	14.50	43.6	28.31	69.2	9.48	37.4	21.22	34.6
11	55.01	21.1	14.79	44.3	28.60	68.3	9.82	37.1	21.50	34.5
21	55.30	22.1	15.08	45.3	28.90	67.2	10.18	37.4	21.80	34.9
May 1	55.59	23.4	15.37	46.6	29.20	65.9	10.55	38.3	22.12	35.7
11	55.87	25.0	15.66	48.2	29.50	64.6	10.92	39.7	22.44	37.1
21	56.15	26.9	15.93	50.0	29.80	63.3	11.28	41.6	22.77	38.8
31	56.40	28.9	16.19	51.9	30.09	61.9	11.62	44.0	23.08	41.0
June 10	56.63	31.0	16.43	54.0	30.36	60.7	11.93	46.7	23.38	43.4
20	56.84	33.2	16.64	56.1	30.60	59.5	12.21	49.7	23.66	46.1
30	57.01	35.3	16.81	58.2	30.81	58.4	12.45	53.0	23.90	48.9
July 10	57.13	37.4	16.94	60.2	30.98	57.4	12.63	56.3	24.11	51.8
20	57.22	39.4	17.04	62.1	31.11	56.6	12.76	59.7	24.28	54.7
30	57.26	41.2	17.09	63.8	31.20	56.0	12.84	63.0	24.40	57.6
Aug. 9	57.26	42.9	17.09	65.4	31.24	55.6	12.86	66.2	24.47	60.4
19	57.22	44.3	17.05	66.8	31.23	55.3	12.82	69.2	24.49	63.0
29	57.13	45.5	16.97	67.9	31.18	55.2	12.73	72.0	24.46	65.4
Sept. 8	57.01	46.5	16.86	68.8	31.09	55.2	12.59	74.6	24.39	67.5
18	56.87	47.2	16.72	69.5	30.97	55.3	12.40	76.7	24.28	69.3
28	56.70	47.6	16.56	69.9	30.82	55.5	12.18	78.5	24.15	70.8
Oct. 8	56.52	47.8	16.39	70.0	30.66	55.7	11.94	79.8	23.98	72.0
18	56.34	47.7	16.21	69.9	30.49	56.0	11.68	80.7	23.80	72.8
28	56.17	47.4	16.04	69.6	30.32	56.3	11.41	81.1	23.61	73.2
Nov. 7	56.01	46.8	15.88	69.0	30.17	56.7	11.15	81.0	23.41	73.1
17	55.88	45.9	15.75	68.2	30.03	57.0	10.90	80.4	23.23	72.7
27	55.77	44.8	15.64	67.2	29.92	57.4	10.67	79.3	23.06	71.9
Dec. 7	55.70	43.5	15.57	66.0	29.84	57.8	10.47	77.2	22.91	70.7
17	55.67	42.0	15.54	64.6	29.80	58.2	10.31	75.7	22.78	69.1
27	55.67	40.4	15.55	63.1	29.79	58.5	10.19	73.3	22.69	67.3
37	55.72	38.7	15.59	61.5	29.82	58.8	10.12	70.7	22.63	65.2

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	α Cephei. 3.		β Aquarii. 3.		β Cephei. 3.		ι Pegasi. 2, 3.		α Aquarii. 3.	
	h. m. s. U 21 9 41.88 L 9 11 39.84		h. m. s. 21 12 40.48		h. m. s. U 21 21 39.95 L 9 23 37.91		h. m. s. 21 31 38.32		h. m. s. 21 52 34.84	
	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. N.	R. A.	Dec. N.	R. A.	Dec. S.
	h. m. 21 14	° ′ 61 55	h. m. 21 23	° ′ 6 14	h. m. 21 26	° ′ 69 52	h. m. 21 36	° ′ 9 10	h. m. 21 57	° ′ 1 3
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	51.16	67.8	23.66	55.1	36.29	71.5	34.39	9.7	49.33	68.0
11	50.96	65.1	23.64	55.7	35.95	68.9	34.36	8.4	49.29	68.7
21	50.84	62.1	23.65	56.2	35.71	66.0	34.35	7.1	49.27	69.5
31	50.78	59.0	23.70	56.6	35.57	62.9	34.37	5.9	49.28	70.1
Feb. 10	50.82	55.4	23.77	56.9	35.55	59.6	34.42	4.7	49.31	70.6
20	50.94	52.3	23.89	57.0	35.65	56.1	34.52	3.6	49.39	71.1
Mar. 2	51.14	49.4	24.03	56.9	35.87	53.0	34.64	2.8	49.49	71.2
12	51.41	46.9	24.19	56.6	36.19	50.2	34.79	2.3	49.63	71.1
22	51.75	44.7	24.39	56.0	36.61	47.9	34.97	2.1	49.79	70.8
Apr. 1	52.16	43.1	24.61	55.2	37.13	46.0	35.19	2.2	49.98	70.2
11	52.61	42.1	24.86	54.2	37.71	44.6	35.43	2.7	50.21	69.4
21	53.10	41.6	25.13	52.9	38.35	43.9	35.69	3.5	50.46	68.2
May 1	53.62	41.8	25.42	51.5	39.02	43.8	35.97	4.7	50.73	66.9
11	54.14	42.6	25.72	49.9	39.71	44.3	36.27	6.2	51.02	65.3
21	54.66	44.0	26.02	48.2	40.39	45.4	36.57	7.9	51.32	63.5
31	55.16	45.9	26.32	46.5	41.04	47.0	36.88	9.8	51.63	61.6
June 10	55.62	48.3	26.62	44.7	41.65	49.2	37.17	11 9	51.93	59.7
20	56.03	51.1	26.90	43.0	42.19	51.9	37.45	14.1	52.22	57.8
30	56.39	54.2	27.15	41.3	42.66	54.9	37.71	16.3	52.50	55.9
July 10	56.68	57.6	27.38	39.8	43.05	58.2	37.94	18.5	52.75	54.0
20	56.89	61.1	27.57	38.4	43.34	61.7	38.13	20.6	52.96	52.4
30	57.03	64.8	27.72	37.2	43.52	65.3	38.29	22.6	53.13	50.8
Aug. 9	57.09	68.4	27.83	36.3	43.60	69.0	38.40	24.4	53.27	49.5
19	57.06	72.0	27.89	35.5	43.58	72.7	38.46	26.1	53.36	48.4
29	56.96	75.4	27.90	35.0	43.45	76.3	38.49	27.5	53.41	47.5
Sept. 8	56.79	78.6	27.87	34.6	43.22	79.7	38.47	28.8	53.41	46.8
18	56.55	81.5	27.81	34.4	42.90	82.8	38.41	29.8	53.38	46.3
28	56.25	84.1	27.71	34.4	42.50	85.7	38.32	30.5	53.31	46.1
Oct. 8	55.90	86.3	27.59	34.6	42.03	88.1	38.21	31.0	53.21	46.0
18	55.52	88.0	27.45	34.9	41.51	90.1	38.07	31.3	53.09	46.1
28	55.12	89.2	27.30	35.2	40.94	91.7	37.92	31.3	52.96	46.4
Nov. 7	54.70	89.8	27.15	35.7	40.35	92.7	37.77	31.0	52.82	46.8
17	54.28	89.9	27.01	36.2	39.75	93.1	37.63	30.6	52.68	47.3
27	53.87	89.4	26.88	36.8	39.16	92.9	37.49	30.0	52.55	47.9
Dec. 7	53.49	88.4	26.77	37.4	38.60	92.1	37.37	29.1	52.43	48.6
17	53.15	86.8	26.68	38.1	38.08	90.8	37.27	28.1	52.32	49.4
27	52.85	84.7	26.61	38.7	37.62	88.9	37.19	27.0	52.24	50. 2
37	52.62	82.2	26.58	39.3	37.23	86.5	37.13	25.7	52.18	51. 0

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APPARENT PLACES OF THE PRINCIPAL FIXED STARS,

FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	α Gruis. 2.		ζ Pegasi. 3.		α Piscis Australis. 1. (*Fomalhaut.*)		α Pegasi. 2. (*Markab.*)		γ Cephei. 3.	
	h. m. s. 21 53 34.74		h. m. s. 22 98 28.95		h. m. s. 22 44 26.44		h. m. s. 23 58 25.14		h. m. s. U 23 27 19.23 L 11 29 17.19	
	R. A.	Dec. S.	R. A.	Dec. N.	R. A.	Dec. S.	R. A.	Dec. N.	R. A.	Dec. N.
	h. m. 21 58	° ′ 47 42	h. m. 22 33	° ′ 10 1	h. m. 22 49	° ′ 30 26	h. m. 22 57	° ′ 14 22	h. m. 23 32	° ′ 76 45
	s.	″	s.	″	s.	″	s.	″	s.	″
Jan. 1	25.63	34.3	44.27	35.1	4.36	34.3	3.02	31.2	62.52	87.5
11	25.54	32.8	44.19	34.0	4.26	33.9	2.93	30.1	61.71	86.5
21	25.49	31.0	44.14	32.9	4.19	33.2	2.85	28.8	60.97	84.9
31	25.49	29.0	44.11	31.7	4.14	32.2	2.80	27.6	60.31	82.8
Feb. 10	25.53	26.8	44.10	30.6	4.12	31.0	2.77	26.3	59.78	80.3
20	25.63	24.2	44.13	29.6	4.14	29.5	2.77	25.1	59.39	77.5
Mar. 2	25.77	21.7	44.20	28.7	4.19	27.9	2.81	24.1	59.18	74.4
12	25.95	19.1	44.30	28.2	4.29	25.9	2.89	23.2	59.11	71.3
22	26.18	16.5	44.43	27.9	4.42	23.9	3.00	22.6	59.25	67.9
Apr. 1	26.45	14.0	44.59	27.9	4.59	21.7	3.14	22.3	59.57	65.0
11	26.75	11.5	44.79	28.2	4.79	19.5	3.32	22.4	60.05	62.4
21	27.10	9.2	45.03	28.9	5.03	17.2	3.54	22.9	60.69	60.2
May 1	27.47	7.1	45.29	29.9	5.30	15.0	3.79	23.7	61.46	58.4
11	27.87	5.2	45.57	31.3	5.60	12.8	4.07	24.8	62.33	57.2
21	28.28	3.6	45.87	32.9	5.92	10.7	4.37	26.2	63.28	56.5
31	28.70	2.3	46.18	34.7	6.26	8.7	4.68	27.9	64.28	56.4
June 10	29.11	1.3	46.49	36.7	6.60	7.0	4.99	29.9	65.30	56.9
20	29.51	0.8	46.79	38.8	6.95	5.5	5.30	32.0	66.31	58.0
30	29.89	0.6	47.08	41.0	7.28	4.3	5.60	34.2	67.29	59.6
July 10	30.23	0.8	47.34	43.2	7.59	3.4	5.88	36.5	68.21	61.7
20	30.53	1.4	47.58	45.4	7.87	2.8	6.14	38.8	69.04	64.2
30	30.77	2.3	47.78	47.5	8.12	2.6	6.36	41.0	69.77	67.1
Aug. 9	30.96	3.6	47.95	49.4	8.32	2.8	6.55	43.1	70.38	70.3
19	31.09	5.1	48.07	51.2	8.48	3.2	6.69	45.1	70.87	73.7
29	31.15	6.8	48.15	52.8	8.59	4.0	6.79	46.9	71.22	77.4
Sept. 8	31.14	8.7	48.19	54.1	8.65	5.0	6.85	48.6	71.43	81.1
18	31.08	10.6	48.18	55.2	8.66	6.2	6.87	50.0	71.50	84.8
28	30.96	12.5	48.15	56.1	8.63	7.5	6.86	51.1	71.43	88.5
Oct. 8	30.79	14.3	48.08	56.7	8.56	9.0	6.81	52.0	71.22	92.1
18	30.59	15.9	47.98	57.1	8.45	10.4	6.73	52.7	70.88	95.4
28	30.37	17.2	47.87	57.3	8.32	11.7	6.63	53.1	70.42	98.4
Nov. 7	30.13	18.2	47.74	57.2	8.17	13.0	6.52	53.2	69.85	101.1
17	29.88	18.8	47.61	57.0	8.01	14.0	6.39	53.1	69.18	103.3
27	29.65	19.1	47.47	56.5	7.85	14.9	6.26	52.8	68.43	105.0
Dec. 7	29.43	18.9	47.35	55.8	7.69	15.5	6.13	52.2	67.62	106.2
17	29.24	18.4	47.23	55.0	7.54	15.8	6.00	51.4	66.77	106.7
27	29.09	17.5	47.12	54.0	7.41	15.8	5.89	50.5	65.91	106.6
37	28.97	16.3	47.03	52.9	7.30	15.6	5.78	49.3	65.07	105.9

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ELEMENTS FOR FACILITATING THE COMPUTATION OF OCCULTATIONS OF CERTAIN STARS BY THE MOON,

1845	Star's Name.	Mag.	Star's R. A.	Star's Dec.	T	H	p	q	p′	q
Jan.			h. m. s.	° ′ ″	h. m	° ′				
3	ι^1 Librae	5.6	15 3 23.94	−19 12 0.2	18 42	− 21 36.8	−.6978	+0.5951	.5905	−.1192
9	π^1 Aquarii	6	20 50 24.02	−13 38 54.5	10 15	+130 27.1	+.6130	1.0693	.5745	+.1855
12	16 Piscium	6	23 28 29.39	+ 1 14 45.0	9 27	+ 81 51.2	+.0871	0.6811	.5378	+.2123
12	m Piscium	6	23 38 28.83	+ 2 37 49.0	15 41	+173 6.7	+.8175	0.5466	.5359	+.2101
15	19 Arietis	7	2 4 39.87	+14 33 6.4	16 23	+150 3.1	+.8065	1.0744	.5352	+.1450
16	ρ^2 Arietis	6	2 47 7.61	+17 42 9.9	11 37	+ 68 43.5	−.0909	0.1550	.5360	+.1183
16	ρ^3 Arietis	6	2 47 43.12	+17 24 13.2	12 6	+ 75 50 8	+.0133	0.5414	.5378	+.1168
16	53 Arietis	6	2 58 44.01	+17 16 43.9	19 0	+176 52.6	+.8379	1.4551	5414	+.1069
16	54 Arietis	6.7	2 59 35.90	+18 11 52.1	19 20	+181 40.5	+.7866	0.4760	.5391	+.1061
17	F^1 Tauri	6.7	3 33 25.24	+19 12 6.0	9 0	+ 18 46.8	−.6792	0.6732	.5424	+.0844
17	F^2 Tauri	7	3 34 51.81	+19 10 25.5	10 0	+ 33 27.6	−.5140	0.7875	5430	+.0827
19	G Tauri	3.4	5 28 25.51	+21 2 31 6	18 0	+127 22.2	+.6327	+0.5709	.5499	−.0183
20	15 Geminor	6	6 17 34.89	+20 52 36.5	16 26	+ 92 30 1	+.2267	−0.1230	5471	−.0597
20	16 Geminor	6	6 18 46.32	+20 34 54.9	17 17	+104 59.4	+.3846	+0.1522	5480	−.0615
20	ν Geminor	5	6 19 48.17	+20 18 11.4	18 0	+115 30.7	+.5112	0.4166	.5562	−.0624
22	1 Cancri	6	7 48 13.42	+16 11 52.3	9 51	− 27 12.5	−.7930	1.0946	.5449	−.1276
22	r Cancri	6	7 52 42.02	+16 52 32.8	12 0	+ 4 0.8	−.7991	0.0716	.5418	−.1313
23	A^2 Cancri	6	8 38 28.13	+12 40 21.9	10 18	− 32 0.9	−.8391	1.3942	.5399	−.1611
23	a^1 Cancri	6	8 47 29.92	+12 12 40.0	15 33	+ 44 41.6	−.4102	1.0347	.5383	−.1668
23	a^3 Cancri	5	8 50 2.80	+12 27 3.2	17 35	+ 74 38.4	+.0061	0.4317	.5371	−.1690
23	ϵ Cancri	5.6	8 59 23.35	+11 17 5.8	23 47	+165 33.5	+.8478	0.6288	.5359	−.1754
30	1610 Bailey	6	14 2 24.92	−15 25 13.7	2 7	+130 48.7	+.6400	0.2196	.5671	−.1560
30	σ Librae	7	14 43 10.81	+17 42 44.0	17 12	− 12 30.6	−.7407	0.3772	.5765	−.1323
Feb.										
8	χ^1 Piscium	5.6	23 18 59.29	+ 0 24 33.5	15 36	+203 20.8	+.4216	0.5423	.5596	+.2148
8	χ^2 Piscium	6	23 19 18.15	+ 0 16 29.1	15 56	+208 16.7	+.6440	0.7532	.5469	+.2148
12	π Arietis	5	2 40 40.43	+16 49 1.8	17 28	+184 56.5	+.5928	0.6087	.5414	+.1219
14	ω^3 Tauri	5.6	4 8 12.53	+20 11 36.5	9 35	+ 46 27.3	−.4056	0.5001	5455	+.0558
18	1 Cancri	6	7 48 12.35	+16 11 40.0	20 14	+155 35.2	+.7300	0.6288	.5426	−.1303
19	A^3 Cancri	6	8 38 28.37	+12 40 21.4	21 0	+155 32.2	+.8946	0.8208	.5399	−.1632
21	C Sextantis	6	9 58 43.00	+ 6 21 41.5	10 13	− 24 44.8	−.3579	0.8480	.5373	−.1974
22	u Leonis	6	10 47 46.11	+ 1 33 29.2	10 0	− 39 16.9	−.5869	1.1072	.5383	−.2086
22	p^1 Leonis	6	10 55 42.47	+ 0 49 45.5	14 38	+ 28 25.4	−.1923	0.9082	.5389	−.2098
Mar										
1	D Ophiuchi	5	17 34 10.22	+21 35 59.6	19 32	+ 9 24.5	−.7179	0.3890	.5962	+.0180
13	ω^1 Tauri	6	4 0 10.20	+19 11 50.1	15 20	+161 33.8	+.3704	1.1590	.5508	+.0596
15	χ^1 Orionis	5	5 45 14.42	+20 14 28.6	17 23	+168 6.1	+.6056	0.7553	.5474	−.0308
18	29 Cancri	6	8 20 0.23	+14 43 2.7	19 0	+156 41.0	+.0704	0.0510	.5366	−.1476
19	κ Cancri	5.6	8 59 23.29	+11 17 4.0	14 20	+ 77 37.9	+.0349	0.7041	5368	−.1698
22	ϵ Leonis	4.5	11 22 26 59	+ 2 9 13.0	11 7	− 3 33.5	−.6656	1.1500	5541	−.2139
24	i Virginis	5	13 18 35.41	+11 54 10.0	17 42	+ 68 23.8	−.0808	0.5219	.5670	−.1831
27	ω Ophiuchi	5	16 22 59.98	+21 7 43.4	22 58	+112 14.4	+.5421	0.4799	.5976	−.0422
30	2270 Bailey	6	19 19 5.63	+18 39 59.0	19 0	+ 3 44.3	−.7203	0.4320	.5838	+.1105
Apr.										
11	666 Bailey	6.7	5 24 27.54	+20 21 25.7	15 33	+172 20.0	+.6062	0.6265	.5492	−.0131
14	1 Cancri	6	7 48 12.28	+16 11 52 0	12 0	+ 85 57.5	+.1521	0.3304	.5353	−.1246
15	A^3 Cancri	6	8 38 27.48	+12 40 22.3	13 0	+ 89 25.3	+.1797	0.6640	.5326	−.1562
23	λ Librae	5	15 44 24.02	+19 42 0.0	13 24	− 3 9.8	−.7254	0.2343	.6045	−.0831
23	ω^1 Scorpii	4.5	15 57 48.34	−20 14 41.2	20 30	+100 16.7	+.4346	0.2439	.6067	−.0669
23	ω^2 Scorpii	4.5	15 58 22.78	−20 26 41.9	21 0	+107 39.3	+.6030	0.4100	6011	−.0657
25	β Sagitt.	3.4	18 4 32.60	−21 5 32.1	20 0	+ 63 2.6	−.2354	0.6701	6022	+ 0493
26	d Sagittarii	5	19 8 36.44	−19 13 12.4	21 40	+ 73 4.9	−.0238	0 8014	.5895	+.1052
28	β^2 Capricor	3.4	20 12 20.01	−15 15 47.0	0 0	+ 93 13.9	−.0768	0.2062	.5761	+.1504
28	v Aquarii	5	21 1 10.58	−11 59 33.5	20 27	+ 28 36.7	−.6874	0.2371	.5626	+.1770
May										
2	51 Piscium	6.7	0 24 23 94	+ 6 4 25.9	21 12	− 6 58.3	−.6621	0.6075	.5378	+.1940
9	χ_4 Orionis	5.6	5 34 18 13	+19 41 13.7	13 0	+154 6.9	+.5776	0.9309	.5492	−.0387
9	χ^5 Orionis	5	5 54 44.01	+20 8 6.2	13 15	+157 46.1	+.5322	0.4287	5489	−.0388
18	i Virginis	5	13 18 35.61	+11 54 11.5	12 44	+ 47 54.2	−.3975	0.0002	.5674	−.1848
21	ω Ophiuchi	5	16 23 1.14	−21 7 44.8	14 0	+ 23 48.3	−.7139	0.6778	.6135	−.0485
22	2 Sagittarii	6	17 29 30.10	−21 48 41.7	14 42	+ 18 41.9	−.7399	0.9307	.6145	+.0144
22	D Ophiuchi	5	17 34 12.52	−21 35 59.3	17 0	+ 52 7.0	−.4034	0.7633	.6151	+.0209
27	κ Aquarii	6	22 29 46.04	− 5 1 14 2	19 0	+ 13 14.3	−.6057	0.9417	.5467	+.2047
28	κ^1 Piscium	5.6	23 19 2.18	+ 0 24 45.8	18 35	+ 4 21.7	−.6449	0.1451	5391	+.2058
28	κ^2 Piscium	5.6	23 19 21.04	+ 0 16 41.4	18 45	− 1 56.0	−.6378	0.3265	.5392	+.2058
29	15 Piscium	7	23 27 34.75	+ 0 27 44.4	0 0	+ 74 58.5	+.0272	1.2995	.5425	+.2048
30	128 Bailey	7	1 3 23.87	+ 9 28 8.9	22 15	+ 26 40.2	−.5465	+0.6363	.5468	+.1815

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ELEMENTS FOR FACILITATING THE COMPUTATION OF OCCULTATIONS OF CERTAIN STARS BY THE MOON,

1845	Star's Name.	Mag.	Star's R. A.	Star's Dec.	T	H	p	q	p'	q'
			h. m. s.	° ′ ″	h. m.	° ′				
Jun.										
9	α Cancri	5.6	8 59 22.23	+11 17 7.5	15 0	+168 29.2	+.5999	0.3463	.5252	—.1657
12	e Leonis	4.5	11 22 25.95	— 2 9 11.4	16 39	+160 29.7	+.6239	0.9290	.5288	—.3917
15	1610 Bailey	6	14 2 25.75	—15 34 12.0	19 15	+162 33.4	+.6252	0.8776	.5753	—.1547
16	o Librae	7	14 43 14.00	—17 42 49.4	10 0	+ 14 13.0	—.6610	0.9050	.5751	—.1311
16	μ1 Librae	5.6	15 3 27.83	—19 12 9.8	20 34	+168 5.5	+.7618	1.1023	.5929	—.1194
16	μ2 Librae	6.7	15 4 33.85	—19 3 42.2	21 0	+174 20.0	+.7603	0.9167	.5934	—.1194
17	λ Librae	5	15 44 24.55	—19 42 0.6	10 0	— 0 5.6	—.7778	0.2667	.6059	—.0841
17	ω1 Scorpii	4.5	15 57 48.94	—20 14 41.9	17 9	+101 50.5	+.3624	0.2721	.6106	—.0861
17	ω2 Scorpii	4.5	15 58 23.39	—20 26 42.6	17 27	+108 28.0	+.5031	0.4396	.6095	—.0668
19	μ1 Sagittarii	3.4	18 4 33.81	—21 5 30.2	14 27	+ 23 46.3	—.6169	0.6184	.6180	+.0483
20	d Sagittarii	5	19 8 27.87	—19 13 8.2	14 13	+ 15 13.8	—.7259	0.6291	.6094	+.1061
21	δ2 Capricor	3.4	20 12 21.54	—15 15 40.4	15 30	+ 19 35.3	—.4466	0.0538	.5355	+.1543
27	π Piscium	6	1 28 54.63	+11 20 59.2	16 30	— 38 35.7	—.7839	0.6620	.5385	+.1668
29	374 Bailey	7	3 18 15.42	+18 12 36.1	21 15	+ 7 29.0	—.6652	0.8638	.5450	+.0955
July										
1	h Tauri	5.6	4 58 39.77	+20 12 28.4	21 0	— 19 24.4	—.6142	0.7243	.5512	+.0138
14	κ Librae	5	15 33 5.29	—19 10 21.6	17 35	+143 24.6	+.7112	0.0372	.5955	—.0484
15	ω Ophiuchi	5	16 23 1.36	—21 7 44.8	11 0	+ 39 53.5	—.5659	0.7812	.6036	—.0495
16	2 Sagittarii	6	17 29 30.63	—21 48 41.2	12 0	+ 39 17.8	—.6583	0.9817	.6120	+.0125
16	D Ophiuchi	5	17 34 13.07	—21 35 58.7	14 50	+ 73 44.2	—.0006	0.8162	.6130	+.0164
19	σ Aquarii	5	21 1 12.78	—11 59 22.0	23 42	+158 18.5	+.7444	0.4464	.5866	+.1844
22	λ Piscium	5	23 34 11.98	+ 0 56 4.2	16 30	+ 14 43.4	—.6766	0.7427	.5524	+.2069
Aug										
5	p1 Leonis	6	10 55 42.15	+ 0 49 50.5	14 28	+187 33.8	+.5776	0.9243	.5259	—.1981
8	i Virginis	5	13 18 34.85	—11 54 7.3	13 33	+141 0.8	+.6533	0.7991	.5475	—.1734
12	ρ Ophiuchi	4.5	17 11 46.79	—20 56 18.1	16 0	+123 30.4	+.5752	0.2721	.6039	—.0009
13	μ1 Sagitt.	3.4	18 4 33.88	—21 5 29.8	10 25	+ 27 19.0	—.6088	0.8141	.6047	+.0437
13	μ2 Sagitt.	6	18 6 2.46	—20 45 55.7	11 0	+ 35 43.3	—.6005	0.5140	.6060	+.0448
14	d Sagittarii	5	19 8 38.23	—19 13 6.8	11 0	+ 21 3.5	—.6789	0.7269	.6035	+.1003
26	E2 Orionis	5.6	6 5 46.62	+19 12 17.9	17 44	— 30 7.4	—.6187	1.0551	.5479	—.0392
28	l Cancri	6	7 48 13.82	+16 11 52.3	19 42	— 24 11.2	—.4906	0.3879	.5374	—.1173
Sep.										
5	1600 Bailey	6.7	13 56 6.69	—14 13 36.3	12 0	+136 7.7	+.5929	0.6290	.5590	—.1542
7	λ Librae	5	15 44 23.67	—19 41 58.2	10 35	+ 89 30.4	+.4048	0.7275	.5819	—.0769
12	σ Aquarii	5	21 1 12.98	—11 59 19.9	19 21	+147 5.4	+.6958	0.4898	.5801	+.1778
15	λ Piscium	5	23 34 12.85	+ 0 56 10.9	12 11	+ 4 0.2	—.6697	0.4826	.5619	+.2082
16	δ1 Piscium	5	0 40 42.97	+ 6 44 53.4	20 46	+117 27.9	+.5550	1.0798	.5593	+.1909
21	ε Tauri	4	4 19 36.20	+18 50 0.3	1 0	+130 21.1	+.1362	1.0294	.5559	+.0466
22	γ2 Orionis	5	5 45 49.74	+19 42 48.0	16 0	— 24 35.7	—.5939	0.5308	.5488	—.0220
27	C Sextantis	6	9 58 42.27	+ 6 21 44.5	21 0	— 7 40.8	—.6924	0.9239	.5298	—.1824
Oct.										
3	1692 Bailey	6	14 42 57.24	—17 8 34.0	14 0	+188 54.6	+.2052	0.9702	.5742	—.1259
4	φ Librae	6	15 30 2.26	—18 47 16.5	10 28	+117 57.2	+.5834	0.4390	.5848	—.0894
4	κ Librae	5	15 33 4.14	—19 0 17.9	12 0	+140 15.5	+.7449	0.6961	.5843	—.0665
12	λ Piscium	5	23 34 12.86	+ 0 56 11.6	23 0	+193 18.5	+.5538	0.9819	.5572	+.2042
23	α1 Cancri	6	8 47 30.51	+12 12 38.2	17 34	— 15 53.7	—.5076	0.4281	.5278	—.1501
23	α2 Cancri	5	8 50 3.38	+12 27 1.2	18 30	— 2 29.6	—.7001	0.0241	.5269	—.1511
Nov										
1	1868 Bailey	7	16 10 5.64	—19 50 3.1	9 55	+127 15.9	+.5121	0.3668	.5992	—.0574
1	ψ Ophiuchi	5	16 15 4.92	—19 40 5.7	12 0	+157 21.2	+.5812	0.0867	.6010	—.0519
2	ρ Ophiuchi	4.5	17 11 45.53	—20 56 16.2	10 14	+117 35.8	+.6027	0.7720	.6013	—.0014
2	1990 Bailey	6	17 15 29.03	—21 17 20.3	12 0	+143 14.3	+.7896	1.1100	.5998	+.0033
3	μ1 Sagitt.	6	18 16 9.65	—20 36 54.4	11 19	+118 46.6	+.5335	1.1552	.5962	+.0571
4	ρ2 Sagitt.	5.6	19 12 49.89	—18 35 2.5	9 0	+ 70 45.0	—.0064	0.8435	.5898	+.1018
5	β1 Capricor	7	20 12 6.91	—15 15 43.2	9 0	+ 56 54.8	—.2686	0.4539	.5798	+.1432
5	β2 Capricor	3.4	20 12 21.13	—15 15 38.8	9 16	+ 60 52.0	—.1789	0.4909	.5798	+.1432
5	2414 Bailey	7	20 25 36.66	—14 14 43.9	16 16	+162 50.3	+.6391	0.5049	.5758	+.1539
7	G Aquarji	6	22 16 4.26	— 5 36 49.4	17 0	+148 13.5	+.5030	0.4428	.5558	+.1974
10	62 Piscium	6	0 40 19.17	+ 6 27 34.0	10 46	+ 91 21.8	—.6096	0.9831	.5510	+.1876
10	δ Piscium	5	0 40 43.11	+ 6 44 54.9	11 0	+ 94 46.4	+.5780	0.7235	.5507	+.1872
16	ε Tauri	4	4 19 39.43	+18 50 1.8	17 43	+ 75 0.4	+.0555	0.8686	.5621	—.0466
18	1 Cancri	6	7 48 14.88	+16 11 46.2	20 0	+ 61 8.8	—.2788	0.0443	.5358	—.0979
19	A2 Cancri	6	8 38 29.54	+12 40 16.9	22 0	+ 79 39.2	+.0183	0.4474	.5964	—.1463
20	ω Leonis	6.7	9 20 12.64	+ 9 43 29.0	18 18	— 14 33.4	—.6406	0.5466	.5927	—.1645
21	19Sextantis	7	10 4 47.44	+ 5 29 25.6	17 35	— 6 22.9	—.6319	1.2981	.5217	—.1797
22	κ Leonis	6	10 47 46.99	+ 1 33 25.1	16 0	— 29 57.5	—.0172	1.2817	.5233	—.1902
24	χ Virginis	6	12 31 17.43	— 7 8 42.4	20 0	— 3 42.0	—.5913	0.5580	.5427	—.1629

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ELEMENTS FOR FACILITATING THE COMPUTATION OF OCCULTATIONS OF CERTAIN STARS BY THE MOON,

1845 Dec.	Star's Name.	Mag.	Star's R. A.	Star's Dec.	T	H	p	q	p'	q'
			h. m. s.	° ′ ″	h. m	° ′				
3	o Aquarii	5	21 1 11.85	—11 59 23.1	14 0	+147 26.8	+.7375	+0.6955	.5760	+.1740
6	λ Piscium	5	23 34 12.36	+ 0 56 9.2	9 0	+ 36 56.8	—.5109	0.5809	.5481	+.2008
6	22 Piscium	6	23 44 5.39	+ 2 4 36.0	15 49	+137 0.3	+.6570	0.7626	.5473	+.1817
7	δ Piscium	5	0 40 42.90	+ 6 44 53.6	18 44	+167 42.3	+.5067	1.0660	.5464	+.1846
13	χ^2 Orionis	6	5 45 51.81	+19 42 46.0	16 20	+ 61 14.0	—.1023	0.3605	.5543	—.0242
17	κ Cancri	5.6	8 59 27.53	+11 16 55.7	14 38	— 8 47.1	—.6337	0.6845	.5252	—.1543
19	s Sextartis	6	10 37 14.22	+ 3 17 46.4	18 0	+ 19 22.3	—.6714	0.6156	.5182	—.1867
20	1348 Bailey	7	11 20 2.74	+ 0 51 15.2	16 35	— 11 39.2	—.6261	0.8682	.5209	—.1913
21	1364 Bailey	7	11 30 32.97	— 1 35 7.0	0 0	+ 97 16.6	+.3953	0.9367	.5232	—.1916
22	g Virginis	5.6	12 59 50.57	— 9 54 52.4	19 0	+ 1 43.1	—.5182	1.0916	.5405	—.1780
23	1600 Bailey	6.7	13 56 7.72	—14 13 42.9	21 0	+ 18 42.9	—.6162	1.2236	.5586	—.1559
25	β^1 Scorpii	2	15 56 29.13	—19 22 37.2	23 30	+ 22 12.0	—.6527	0.4307	.5069	—.0745
31	c^1 Capricor	6	21 36 46.38	— 9 46 59.6	13 30	+158 37.9	+.6745	+1.0738	.5753	+.1903

OCCULTATIONS OF FIXED STARS BY THE MOON,

VISIBLE AT PHILADELPHIA.

The angles are for *Direct Image*, and reckoned from the Moon's *North Point* and from its *Vertex* around through East, South, West, to North and Vertex again. For *Inverted Image*, or as seen in an astronomical telescope, add 180°.

Day of the month.	Star's Name.	Magnitude.	IMMERSION. Mean Time.	IMMERSION. Sidereal Time.	IMMERSION. Angle from N. Point	IMMERSION. Angle from Vertex.	EMERSION. Mean Time.	EMERSION. Sidereal Time.	EMERSION. Angle from N. Point	EMERSION. Angle from Vertex.
Jan.			h. m.	h. m.	°	°	h. m.	h. m.	°	°
12	16 Piscium	6	3 42	23 10	68	74	5 2	0 31	227	245
12	m Piscium	6	‡10 13	5 43	47	357	‡11 3	6 33	274	294
16	ρ^2 Arietis	6	6 20	2 5	21	42	7 20	3 5	298	289
16	ρ^3 Arietis	6	6 17	2 2	104	125	7 34	3 19	218	199
16	54 Arietis	6.7	13 54	9 41	50	1	14 42	10 28	301	256
19	ζ Tauri	3.4	12 27	8 25	132	79	13 31	9 29	248	193
20	16 Geminorum	6	11 39	7 41	55	17	12 36	8 37	333	284
20	ν Geminorum	5	12 19	8 21	110	64	13 37	9 39	280	226
23	α^3 Cancri	5	11 47	8 1	113	134	13 14	9 28	300	286
23	κ Cancri	5.6	17 59	14 14	127	76	18 53	15 8	274	294
30	ς Librae	7	11 48	8 29	45	96	12 23	9 4	229	282
Feb.										
12	π Arietis	5	‡12 15	9 47	70	22	‡13 7	10 39	277	234
14	ω^3 Tauri	5.6	3 58	1 37	107	158	5 12	2 51	226	262
18	1 Cancri	6	14 48	12 45	118	65	15 48	13 44	282	231
19	A^2 Cancri	6	15 46	13 47	186	134	16 3	14 4	219	167
March										
1	D Ophiuchi	5	14 5	12 45	62	117	15 5	13 45	279	334
15	χ^1 Orionis	5	12 15	11 50	124	73	13 8	12 43	256	208
19	κ Cancri	5.6	9 7	8 56	165	107	10 4	9 54	249	230
24	i Virginis	5	12 5	12 15	117	141	13 23	13 34	274	268
27	ω Ophiuchi	5	17 9	17 32	139	105	18 9	18 32	243	195
30	2270 Bailey	6	13 34	14 8	52	105	14 30	15 4	272	326
April										
11	666 Bailey	6.7	10 20	11 41	92	41	‡11 16	12 37	284	237
14	1 Cancri	6	6 10	7 42	98	101	7 37	9 9	305	272
15	A 2 Cancri	6	7 42	9 18	157	144	8 48	10 24	255	219
25	μ^1 Sagittarii	3.4	14 44	17 0	43	56	15 42	17 39	307	308
26	d Sagittarii	5	16 1	18 22	64	75	17 21	19 42	267	260
May										
2	51 Piscium	6.7	15 33	18 18	56	106	16 31	19 16	258	309
9	χ^2 Orionis	5	8 14	11 24	60	6	8 59	12 10	323	272
18	i Virginis	5	7 19	11 5	132	173	8 32	12 19	274	297
21	ω Ophiuchi	5	8 41	12 39	78	119	9 40	13 39	307	340
22	2 Sagittarii	6	9 30	13 32	134	175	10 20	14 23	237	272
22	D Ophiuchi	5	11 38	15 40	71	95	12 49	16 52	291	300
27	κ Aquarii	6	13 19	17 42	123	171	13 57	18 20	192	237
28	κ 2 Piscium	5.6	*13 48	18 15						
30	128 Bailey	7	16 32	21 7	78	127	17 40	22 15	229	273

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OCCULTATIONS OF FIXED STARS BY THE MOON,

VISIBLE AT PHILADELPHIA.

The angles are for *Direct Image*, and reckoned from the Moon's *North Point* and from its *Vertex* around through East, South, West, to North and Vertex again. For *Inverted Image*, or as seen in an astronomical telescope, add 180°.

Day of the month.	Star's Name.	Magnitude.	IMMERSION. Mean Time.	IMMERSION. Sidereal Time.	IMMERSION. Angle from N. Point	IMMERSION. Angle from Vertex.	EMERSION. Mean Time.	EMERSION. Sidereal Time.	EMERSION. Angle from N. Point	EMERSION. Angle from Vertex.
June			h. m.	h. m.	°		h. m.	h. m.	°	
9	κ Cancri	5.6	*10 5	15 18						
12	e Leonis	4.5	11 46	17 11	165	115	‡12 20	17 46	236	186
19	μ^1 Sagittarii	3.4	9 14	15 7	42	76	10 6	15 59	319	345
20	d Sagittarii	5	8 51	14 47	64	108	9 51	15 47	285	322
29	374 Bailey	7	16 6	22 40	9	63	16 31	23 4	326	29
July										
1	h Tauri	5.6	15 15	21 56	99	146	16 9	22 50	244	296
16	2 Sagittarii	6	6 51	14 29	133	166	7 46	15 25	236	262
16	D Ophiuchi	5	9 8	16 47	75	85	10 26	18 5	281	274
22	λ Piscium	5	10 54	18 57	86	135	11 55	19 57	222	267
Aug.										
8	i Virginis	5	8 10	17 19	126	83	9 14	18 23	267	219
13	μ^1 Sagittarii	3.4	4 55	14 23	98	138	6 4	15 33	264	295
13	μ^2 Sagittarii	6	* 6 14	15 43						
14	d Sagittarii	5	5 33	15 6	81	123	6 40	16 13	269	302
28	1 Cancri	6	13 56	0 26	38	85	14 27	0 56	334	23
Sept.										
5	1600 Bailey	6.7	6 34	17 34	82	42	7 39	18 39	305	258
12	ν Aquarii	5	14 8	1 36	32	346	14 55	2 24	282	233
15	λ Piscium	5	6 47	18 26	31	81	7 35	19 15	284	332
22	χ^2 Orionis	5	10 19	22 26	58	104	11 8	23 16	293	343
27	C Sextantis	6	*16 2	4 30						
Oct.										
4	φ Libræ	6	* 5 14	18 8						
4	κ Libræ	5	6 21	19 15	91	51	7 26	20 20	275	228
23	α^1 Cancri	6	11 35	1 45	70	118	12 26	2 36	313	4
Nov.										
2	ρ Ophiuchi	4.5	4 27	19 15	76	42	5 38	20 27	272	237
4	ρ^2 Sagittarii	5.6	3 11	18 7	72	87	4 33	19 28	260	257
5	β^1 Capricorni	7	* 4 19	19 19						
5	β^2 Capricorni	3.4	4 28	19 28						
7	G Aquarii	6	12 4	3 13	45	357	‡13 0	4 9	269	219
10	δ Piscium	5	5 23	20 43	99	148	6 25	21 45	217	260
19	A^2 Cancri	6	16 20	8 17	109	118	17 51	9 48	300	274
20	ω Leonis	6.7	12 36	4 36	106	156	13 50	5 50	290	338
24	χ Virginis	6	‡14 9	6 25	88	139	15 9	7 25	294	343
Dec.										
3	ν Aquarii	5	8 29	1 20	64	19	‡ 9 27	2 18	251	202
6	λ Piscium	5	3 30	20 32	57	98	4 44	21 46	248	277
6	22 Piscium	6	10 15	3 18	39	355	11 13	4 16	279	239
13	χ^2 Orionis	6	10 30	4 1	84	127	12 1	5 31	277	286
17	κ Cancri	5.6	8 55	2 41	81	131	9 54	3 40	305	357
19	π Sextantis	6	12 27	6 22	111	159	13 41	7 36	296	338
20	1348 Bailey	7	‡11 21	5 20	35	85	11 36	5 35	6	56

* A near approach.

‡ Star below the horizon.

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ECLIPSES OF THE SUN AND MOON.

In the year 1845 there will be two Eclipses of the Sun and two of the Moon.

I. *An Annular Eclipse of the Sun, May 6th, partly visible in the north-eastern portion of the United States.*

Begins on the Earth generally May 5d 19h 49.2m, Mean Time at Greenwich, in longitude 36° 55′ W. of Greenwich, and latitude 27° 13′ N.

Central Eclipse begins generally May 5d 21h 57.6m, in longitude 103° 29′ W. of Greenwich, and latitude 66° 43′ N.

Central Eclipse ends generally May 5d 22h 20.2m, in longitude 139° 58′ W. of Greenwich, and latitude 72° 39′ N.

Ends on the Earth generally May 6d 0h 28.7m, in longitude 101° 9′ E. of Greenwich, and latitude 48° 6′ N.

The positions on the Earth's surface passed over by the line of Central and Annular phase, and the line of Southern limits, are as follows; the longitudes being reckoned from Greenwich.

Central Line.

Longitude.	Latitude.
103° 39′ W.	66° 43′ N.
100 10 "	69 1 "
101 52 "	72 56 "
104 30 "	75 57 "
131 10 "	74 53 "
136 58 "	72 39 "

Southern Limit.

Longitude.	Latitude.
41° 16′ W.	13° 44′ N.
30 35 "	17 29 "
22 38 "	20 54 "
11 24 "	26 37 "
0 10 E.	33 6 "
13 6 "	39 28 "
28 11 "	44 9 "
45 40 "	45 58 "
63 15 "	44 46 "
79 27 "	41 39 "
89 55 "	38 55 "
102 41 "	35 5 "

By referring to a map it will be seen that the line of Central and Annular phase is confined to a small portion of the Arctic regions of the American continent, and the adjacent Polar Sea.

The End of this Eclipse will be *visible* throughout New England, the greater part of the states of New York, New Jersey, and the eastern part of Pennsylvania. In all other parts of the Union the whole Eclipse will be *invisible*. In Nova Scotia and the north-eastern parts of New Brunswick and Lower Canada, the phase of greatest obscuration will be *visible*.

The limit of *visibility* for the United States will be determined by a line drawn through a series of points where the Eclipse ends at sun-rise. The general direction of this line is nearly North-westerly from Delaware Bay, to where it enters Upper Canada near Toronto. The magnitude of the visible portion of the Eclipse for any place, will therefore depend on its distance North-easterly from this line, while to all places West of it, the whole Eclipse will be invisible.

The positions passed over by that part of the line of rising limit which lies within the and contiguous to the United States are as follows: the longitudes being reckoned from Greenwich.

Eclipse Ends at Sun-rise.

Longitude.	Latitude.	Local Mean Time. d. h. m.	Greenwich Mean Astronomical Time. d. h. m.
74° 48′ W.	38° 30′ N	May 6 4 58.6 m	May 5 21 57.8
75 21 "	39 0 "	4 57.6 "	21 58.9
75 53 "	39 30 "	4 56.5 "	22 0.6
76 26 "	40 0 "	4 55.5 "	22 1.2
76 59 "	40 30 "	4 54.4 "	22 2.3
77 32 "	41 0 "	4 53.3 "	22 3.4
78 6 "	41 30 "	4 52.2 "	22 4.5
78 40 "	42 0 "	4 51.0 "	22 5.6
79 13 "	42 30 "	4 49.9 "	22 6.7
79 47 "	43 0 "	4 48.7 "	22 7.8
80 22 "	43 30 "	4 47.5 "	22 8.9
80 57 "	44 0 "	4 46.2 "	22 10.0

For the following places the local mean time of Sun-rise is computed for the Sun's centre. The angles of last contact are reckoned from the Sun's North point, and from its Vertex round towards the East. For the appearance as seen in an inverting telescope add 180°.

Philadelphia (High School Observatory,) Pennsylvania.

Sun rises eclipsed 6d 4h 53m 30s.
Eclipse ends 4 59 42.

Digits eclipsed at sun-rise 0.88 on the Northern limb.
Magnitude of the Eclipse at sun-rise (Sun's diameter = 1) 0.073.
Angle of last contact from North 58° 27′; from Vertex 106° 38′.

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SOLAR ECLIPSE, MAY 6, 1845, LOCAL MEAN SOLAR TIME.

Burlington, (Gummere's Observatory,) New Jersey.

Sun rises eclipsed	6d 4h 52m 20s.
Eclipse ends	5 1 0.

Digits eclipsed at Sun-rise 1.18 on the Northern limb.
Magnitude of Eclipse at Sun-rise, (Sun's diameter = 1,) 0.098.
Angle of last contact from North 58° 29′; from Vertex 106° 38′.

New York, (City Hall,) New York.

Sun rises eclipsed	6d 4h 53m 56s.
Eclipse ends	5 5 3.

Digits eclipsed at Sun-rise 2.16 on the Northern limb.
Magnitude of Eclipse at Sun-rise, (Sun's diameter = 1,) 0 179.
Angle of last contact from North 58° 48′; from Vertex 106° 39′.

Brooklyn, (Blunt's Observatory,) New York.

Sun rises eclipsed	6d 4h 53m 56s.
Eclipse ends	5 5 6.

Digits eclipsed at Sun-rise 2.23 on the Northern limb.
Magnitude of Eclipse at Sun-rise, (Sun's diameter = 1,) 0.186.
Angle of last contact from North 58° 47′; from Vertex 106° 44′.

New Haven, (College Chapel,) Connecticut.

Sun rises eclipsed	6d 4h 52m 36s.
Eclipse ends	5h 9 54.

Digits eclipsed at Sun-rise 3.32 on the Northern limb.
Magnitude of Eclipse at Sun-rise (Sun's diameter = 1,) 0.277.
Angle of last contact from North 59° 2′; from Vertex 106° 37′.

Germantown, (Wistar's Observatory,) Pennsylvania

Sun rises eclipsed	6d 4h 49m 23s.
Eclipse ends	4 59 44.

Digits eclipsed at Sunrise 0.98 on the Northern limb.
Magnitude of Eclipse at Sun-rise (Sun's diameter = 1,) 0.081.
Angle of last contact from North 58° 28′; from Vertex 106° 38′.

Williamstown, (College,) Massachusetts.

Sun rises eclipsed	6d 4h 49m 23s.
Eclipse ends	5 11 18.

Digits eclipsed at Sun-rise 4.40 on the Northern limb.
Magnitude of Eclipse at Sun-rise (Sun's diameter = 1,) 0.366.
Angle of last contact from North 60° 19′; from Vertex 106° 41′.

Cambridge, (Observatory,) Massachusetts.

Sun rises eclipsed	6d 4h 50m 9s.
Eclipse ends	5 18 12.

Digits eclipsed at Sun-rise 5.07 on the Northern limb.
Magnitude of Eclipse at Sunrise (Sun's diameter = 1,) 0.422.
Angle of last contact from North 59° 24′; from Vertex 106° 31′.

Boston, Massachusetts.

Sun rises eclipsed	6d 4h 50m 1s.
Eclipse ends	5 18 0.

Digits eclipsed at Sun-rise 5.1 on the Northern limb.
Magnitude of Eclipse at Sun-rise (Sun's diameter = 1,) 0.42.
Angle of last contact from North 59° 4′; from Vertex 106° 5′.

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SOLAR ECLIPSE MAY 6, 1845, LOCAL MEAN SOLAR TIME.

Portland, Maine.

Greatest obscuration	6d 4h 24m 31s.
Sun rises eclipsed	4 47 16.
Eclipse ends	5 23 1.

Digits eclipsed at Sun-rise 6.44 on the Northern limb.
Magnitude of Eclipse at Sun-rise (Sun's diameter = 1,) 0.427.
Angle of last contact from North 60° 7′; from Vertex 106° 26′.

Toronto, Upper Canada.

Sun rises eclipsed	6d 4h 46m 55s.
Eclipse ends	4 51 8.

Digits eclipsed at Sun-rise 1.03 on the Northern limb.
Magnitude of Eclipse at Sun-rise (Sun's diameter = 1,) 0.088.
Angle of last contact from North 62° 39′; from Vertex 106° 53′.

Quebec, Lower Canada.

Greatest obscuration	6d 4h 28. 1m.
Sun rises eclipsed	4 38. 4.
Eclipse ends	5 25 6.

Digits eclipsed at Sun-rise 8.7 on the Northern limb.
Magnitude of Eclipse at Sun-rise (Sun's diameter = 1,) 0.72.
Angle of last contact from North 63. 0′; from Vertex 106. 2′

St. John's, New Brunswick.

Sun rises eclipsed	6d 4h 42. 6m.
Greatest obscuration	4 42. 0.
Eclipse ends	5 42. 1.

Digits eclipsed at greatest obscuration 8.9 on the Northern limb.
Magnitude of Eclipse at greatest obscuration (Sun's diameter = 1,) 0.74.
Angle of last contact from North 66. 1′; from Vertex 105. 7′.

Halifax, Nova Scotia.

Sun rises eclipsed	6d 4h 44. 2m.
Greatest obscuration	4 51. 7.
Eclipse ends	5 50. 0.

Digits eclipsed at greatest obscuration 8.6 on the Northern limb.
Magnitude of Eclipse at greatest obscuration (Sun's diameter = 1,) 0.72.
Digits eclipsed at Sun-rise 8 2 on the Northern limb.
Magnitude of Eclipse at Sun-rise (Sun's diameter = 1,) 0.69.
Angle of last contact from North 58. 8′; from Vertex 105. 5′.

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SOLAR ECLIPSE, MAY 6, 1845.

Names of Places.	Local Mean Time.		Angle of last contact from		Magnitude of Eclipse on N. limb.	
	Sun rises eclipsed.	Eclipse ends.	North.	Vertex.	Digits.	Sun's diam. = 1.
	d h m	d h m	°	°		
Albany, N. Y.	May 6 4 50	May 6 5 10	60	107	4.5	0.37
Amherst, Mass.	4 50	5 13	61	107	4.8	0.40
Auburn, N. Y.	4 49	5 1	62	107	2.5	0.21
Augusta, Me.	4 46	5 26	62	107	8.1	0.68
Bangor, Me.	4 44	5 32	61	106	8.6	0.72
Barnstable, Mass.	4 52	5 20	58	106	4.6	0.38
Bridgeport, Mass	4 53	5 9	59	107	3.3	0.27
Bristol, R. I.	4 52	5 16	59	107	4.8	0.40
Brunswick, Me.	4 47	5 26	60	107	8.2	0.65
Buffalo, N. Y.	4 49	4 43	62	107	1.7	0.14
Burlington, N. J.	4 55	5 1	58	107	1.1	0.09
Burlington, Vt.	4 45	5 15	62	107	5.3	0.44
Calais, Me.	4 43	5 37	61	106	8.9	0.74
Castine, Me.	4 45	5 30	61	106	8.4	0.70
Concord, N. H.	4 48	5 19	61	106	6.3	0.52
Dedham, Mass.	4 51	5 18	59	106	4.9	0.41
Dover, N. H.	4 48	5 21	61	107	6.3	0.52
Eastport, Me	4 44	5 38	59	106	9.0	0.75
Exeter, N. H.	4 49	5 21	61	107	6.3	0.52
Fredrickton, N. B.	4 42	5 41	61	107	9.1	0.76
Gloucester, Mass.	4 50	5 21	60	107	6.3	0.52
Greenfield, Mass.	4 50	5 14	60	107	4.8	0.40
Hallowell, Me.	4 46	5 26	61	107	8.1	0.68
Hartford, Conn.	4 52	5 11	60	107	3.4	0.28
Houlton, Me.	4 41	5 38	62	107	9.1	0.76
Hudson, N. Y.	4 51	5 9	60	107	3.4	0.28
Kingston, U. C.	4 46	5 2	63	108	3.3	0.27
Lowell, Mass.	4 50	5 18	60	107	5.2	0.43
Lynn, Mass.	4 50	5 18	60	107	4.6	0.38
Marblehead, Mass.	4 50	5 19	60	107	4.6	0.39
Middletowu, Conn.	4 52	5 12	60	107	3.4	0.27
Montpelier, Vt.	4 46	5 17	61	107	3.5	0.30
Montreal, L. C.	4 42	5 15	62	107	6.3	0.52
Nantucket, Mass.	4 53	5 20	58	106	4.9	0.41
New Bedford, Mass.	4 52	5 18	59	107	5.0	0.42
Newburyport, Mass.	4 49	5.22	61	107	6.3	0.52
New London, Conn.	4 53	5 13	59	107	5.2	0.43
Newport, R. I.	4 53	5 16	58	106	4.8	0.40
Northampton, Mass.	4 50	5 13	60	107	4.8	0.40
Norwich, Conn.	4 52	5 13	59	107	3.9	0.33
Plattsburgh, N. Y.	4 45	5 14	60	107	5.3	0.44
Plymouth, Mass.	4 51	5 20	59	107	5.2	0.40
Portsmouth, N. H.	4 49	5 22	61	107	6.3	0.52
Poughkeepsie, N. Y.	4 50	5 7	60	107	3.2	0.26
Princeton, N. J.	4 55	5 2	59	107	1.4	0.11
Rochester, N. Y.	4 48	4 57	62	107	1.8	0.15
Salem, Mass.	4 50	5 19	60	107	5.2	0.43
Springfield, Mass.	4 51	5 13	60	107	3.9	0.33
Taunton, Mass.	4 51	5 18	59	107	5.0	0.42
Trenton, N. J.	4 55	5 2	58	107	1.4	0.11
Troy, N. Y.	4 49	5 10	61	107	3.9	0.33
Utica, N. Y.	4 48	5 6	62	107	3.2	0.27
Worcester, Mass.	4 50	5 15	60	107	4.5	0.37
York, Me.	4 48	5 22	61	107	6.9	0.58

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SOLAR ECLIPSE MAY 6, 1845.

The following quantities, X, Y, Z, &c., which were computed from Bessel's formulæ, originally published in Schumacher's Astronomische Nachrichten, No. 321, afford a convenient and expeditious means of computing the phases, &c., of this Eclipse for any place where it can be visible. For the method of using them see page .

Greenwich M'n Time.	X	Diffs.	ΔX	Diffs	Y	Diffs.	ΔY	Diffs
d h m								
5 19 50	— 1.367027	+ 84490	+ 0.506918	+ 21	+ 0.740392	+ 16908	+ 0.101464	— 45
20 0	1.282537	84494	0.506939	19	0.757300	16899	0.101419	46
10	1.198043	84497	0.506958	18	0.774199	16891	0.101373	45
20	1.113546	84498	0.506976	17	0.791091	16884	0.101328	46
30	1.029048	84499	0.506993	16	0.807975	16876	0.101282	47
40	0.944549	84500	0.507009	14	0.824851	16869	0.101235	46
50	0.860049	84502	0.507023	13	0.841720	16861	0.101189	46
21 0	0.775547	84504	0.507036	12	0.858581	16853	0.101143	47
10	0.691043	84507	0.507048	11	0.875434	16845	0.101096	47
20	0.606536	84510	0.507059	10	0.892279	16838	0.101049	47
30	0.522026	84512	0.507069	9	0.909117	16830	0.101002	47
40	0.437514	845 5	0.507078	8	0.925947	16822	0.100955	48
50	0.352999	84517	0.507086	7	0.942769	16814	0.100907	47
22 0	0.268482	84518	0.507093	6	0.959583	16806	0.100860	48
10	0.183964	84518	0.507099	4	0.976389	16798	0.100812	48
20	0.099446	84517	0.507103	3	0.993187	16790	0.100764	48
30	— 0.014929	84517	0.507106	2	1.009977	16782	0.100716	48
40	+ 0.069588	84518	0.507108	+ 1	1.026759	16774	0.100668	49
50	0.154106	84518	0.507109	0	1.043533	16766	0.100619	48
23 0	0.238624	84518	0.507109	0	1.060299	16758	0.100571	49
10	0.323142	84518	0.507108	— 1	1.077057	16750	0.100522	49
20	0.407660	84519	0.507106	2	1.093807	16742	0.100473	49
30	0.492179	84519	0.507103	3	1.110549	16734	0.100424	50
40	0.576698	84519	0.507100	3	1.127283	16726	0.100374	49
50	0.661217	84519	0.507096	4	1.144009	16718	0.100325	50
6 0 0	0.745726	84518	0.507091	5	1.160727	16710	0.100275	49
10	0.830244	84517	0.507085	6	1.177437	16702	0.100226	50
20	+ 0.914761	+ 84516	+ 0.507078	— 7	+ 1.194139	+ 16694	+ 0.100176	— 50

GREENWICH HOUR-ANGLE = H.

	m. 0	m. 10	m. 20	m. 30	m. 40	m. 50
d h						
5 19						— 61 36 55.1
20	— 59 6 53.8	— 56 36 52.5	— 54 6 51.3	— 51 36 50 0	— 49 6 48.8	— 46 36 47.5
21	— 44 6 46.3	— 41 36 45.0	— 39 6 43.8	— 36 36 42 5	— 34 6 41.3	— 31 36 40.0
22	— 29 6 38.8	— 26 36 37.5	— 24 6 36.3	— 21 36 35 1	— 19 6 33.8	— 16 36 33.6
23	— 14 6 31.4	— 11 36 30.2	— 9 6 29 0	— 6 36 27.7	— 4 6 26 5	— 1 36 25.3
6 0	+ 0 53 36.0	+ 3 23 37.3	+ 5 53 38.5			

	d	Diff. for 10 m.	Log. I.	L.	Diff. for 10 m.	Log. i.	l.	Diff. for 10 m.
d h								
5 20	+ 16 31 38.6	+ 6.88	7.66636	0.502441	+ 21	7.66419	0.015992	+ 19
21	16 32 19.8	6 87	7.66636	0.502557	17	7.66419	0 016109	16
22	16 33 1.0	6.87	7.66635	0.502632	14	7.66419	0 016204	12
23	16 33 42.2	6.86	7.66635	0.502727	10	7.66418	0.016278	9
6 0	+ 16 34 23.4	+ 6.86	7.66634	0.502780	+ 7	7.66418	0.016331	+ 6

Log. C. 4.7324537 Log. λ. 9.4180286 k sec f 0.272502

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ECLIPSES OF THE SUN AND MOON.

II. *A Total Eclipse of the MOON, May* 21, 1845, *invisible throughout the United States.*

	h. m.	
First contact with the Penumbra.....	1 19.5	Mean Time at Greenwich.
First contact with the Shadow.....	2 17.1	
First total immersion in the Shadow..	3 31.3	
Middle of the Eclipse.....	3 53.9	
Last total immersion in the Shadow..	4 16.5	
Last contact with the Shadow.....	5 30.7	
Last contact with the Penumbra.....	6 28.3	

At these times respectively the Moon will be in the Zenith of the places whose positions are,

Longitude 157° 40′	E. of Greenwich.	Latitude 19° 44′ S.	
" 143 51		" 19 49 "	
" 126 4		" 19 55 "	
" 120 39		" 19 56 "	
" 115 14		" 19 58 "	
" 97 27		" 20 3 "	
" 83 39		" 20 7 S.	

Magnitude of the Eclipse (Moon's diameter = 1,) 1.095, on the Southern limb.

The first contact with the Shadow occurs at 121° from the Northernmost point of the Moon's limb towards the East.

The last contact at 108° towards the West.

This Eclipse will be visible throughout the Eastern continent and the Pacific Ocean.

III. *An Annular Eclipse of the SUN, October 30th,* 1845, *visible only in New Holland, New Zealand, and the Southern Ocean.*

Begins on the Earth generally Oct. 30d 9h 31.6m, Mean Time at Greenwich, in longitude 117° 59′ E. of Greenwich, and latitude 19° 37′ S.

Central Eclipse begins generally Oct. 30d 10h 55.1m, in longitude 88° 22′ E. of Greenwich, and latitude 43° 54′ S.

Central Eclipse at noon Oct. 30d 12h 12.9m, in longitude 172° 42′ E. of Greenwich, and latitude 75° 39′ S.

Central Eclipse ends generally Oct. 30d 12h 46.9m, in longitude 68° 48′ W. of Greenwich, and latitude 67° 37′ S.

Ends on the Earth generally Oct. 30d 14h 10.4m, in longitude 119° 10′ W. of Greenwich, and latitude 45° 17′ S.

The line of Central and Annular Eclipse, and the line of Northern limit, pass over the points of the Earth's surface whose positions are as follows; the longitudes being reckoned from Greenwich.

Central Line.		*Northern Limit.*	
Longitude.	Latitude.	Longitude.	Latitude.
88° 22′ E.	43° 54′ S.	119° 51′ E.	4° 13′ S.
100 13 "	47 39 "	124 23 "	7 47 "
108 39 "	51 13 "	131 23 "	10 27 "
119 48 "	56 55 "	142 47 "	15 47 "
134 28 "	64 37 "	154 12 E.	22 6 "
158 53 "	73 8 "	163 28 W.	37 14 "
172 42 E.	75 39 "	147 18 "	37 14 "
159 12 W.	77 57 "	131 47 "	35 16 "
115 8 "	76 46 "	122 54 "	33 31 "
91 6 "	73 21 "	109 12 W.	30 14 S.
68 48 W.	67 37 S.		

IV. *A Partial Eclipse of the MOON, November* 13, 1845, *mostly visible throughout the United States.*

	h. m.	
First contact with the Penumbra at..	9 57.4	Mean Time at Greenwich.
First contact with the Shadow.....	11 10.2	
Middle of the Eclipse.....	12 49.3	
Last contact with the Shadow.....	14 28.4	
Last contact with the Penumbra.....	15 41.2	

At these times respectively the Moon will be in the Zenith of the places whose positions are

Longitude 25° 26′ E.	of Greenwich.	Latitude 17° 33′ N.	
" 7 50 "		" 17 40 "	
" 16 6 W.		" 17 49 "	
" 40 3 "		" 17 58 "	
" 57 38 "		" 18 4 "	

Magnitude of the Eclipse (Moon's diameter = 1) 0.919, on the Northern limb. The first contact with the Shadow occurs at 51° from the Northernmost point of the Moon's limb towards the East. The last contact at 70° towards the West.

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PARTIAL ECLIPSE, NOVEMBER 13, 1845

The beginning, etc., of this Eclipse, for several of the more important places in the United States, and the British Provinces, will be as follows:—

Names of Places.	Beginning.	Middle.	End.
	d. h. m.	h. m.	h. m.
Albany, N. Y.	13 6 15 a	7 54 a	9 33
Amherst, Mass.	6 20	7 59	9 38
Annapolis, Md.	6 4	7 43	9 22
Augusta, Ga.	5 43	7 23	9 1
Augusta, Me.	6 31	8 10	9 49
Baltimore, Md.	6 4	7 43	9 22
Bangor, Me.	6 35	8 14	9 53
Boston, Mass.	6 26	8 5	9 44
Buffalo, N. Y.	5 55	7 34	9 12
Burlington, Vt.	6 18	7 56	9 35
Cambridge, Mass.	6 26	8 5	9 44
Camden, S. C.	5 48	7 27	9 6
Charleston, S. C.	5 50	7 29	9 8
Cincinnati, Ohio,	5 32	7 11	8 50
Columbia, S. C.	5 46	7 25	9 4
Columbus, Ohio,	5 38	7 17	8 56
Concord, N. H.	6 24	8 3	9 42
Detroit, Mich.	5 38	7 17	8 56
Dover, Del.	6 8	7 47	9 26
Dover, N. H.	6 27	8 6	9 45
Frankfort, Ky.	5 31	7 10	8 49
Halifax, N. S.	6 56	8 35	10 14
Harrisburg, Pa.	6 3	7 42	9 21
Hartford, Ct.	6 19	7 58	9 37
Hudson, (Res. College,) Ohio,	5 45	7 24	9 3
Indianapolis, Ind.	5 26	7 5	8 44
Jackson, Miss.	5 10	6 49	8 28
Kingston, U. C.	6 4	7 49	9 21
Lexington Ky.	5 33	7 12	8 51
Little Rock, Ark.	5 1	6 40	8 19
Louisville, Ky.	5 28	7 7	8 46
Lowell, Mass.	6 25	8 4	9 43
Milledgeville, Ga.	5 37	7 16	8 55
Mobile, Ala.	5 17	6 57	8 35
Montpelier, Vt.	6 20	7 59	9 38
Montreal, L. C.	6 16	7 55	9 34
Nantucket, Mass.	6 30	8 9	9 48
Nashville, Tenn.	5 23	7 2	8 41
Natchez, M'pi.	5 5	6 44	8 23
New Bedford, Mass.	6 26	8 5	9 44
Newbern, N. C.	6 2	7 41	9 20
Newburyport, Mass.	6 27	8 6	9 45
New Haven, Ct.	6 18	7 57	9 36
New London, Ct.	6 22	8 1	9 40
New Orleans, La.	5 10	6 49	8 28
Newport, R. I.	6 25	8 4	9 43
New York, N. Y.	6 14	7 53	9 32
Norfolk, Va.	6 5	7 44	9 23
Northampton, Mass.	6 20	7 59	9 38
Norwich, Ct.	6 23	8 1	9 40
Philadelphia, Pa.	6 9	7 48	9 27
Pittsburg, Pa.	5 50	7 29	9 8
Plymouth, Mass.	6 27	8 6	9 45
Portland, Me.	6 29	8 8	9 47
Portsmouth, N. H.	6 27	8 6	9 45
Princeton, N. J.	6 12	7 50	9 30
Providence, R. I.	6 24	8 3	9 42
Quebec, L. C.	6 25	8 4	9 43
Raleigh, N. C.	5 55	7 34	9 13
Richmond, Va.	6 0	7 39	9 18
St. John's, N. B.	6 46	8 25	10 4
St. Louis, Missouri	5 12	6 51	8 30
Springfield, Ill.	5 12	6 51	8 30
Springfield, Mass.	6 20	7 59	9 38
Tallahasse, Fa.	5 32	7 11	8 50

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PARTIAL ECLIPSE, NOVEMBER 13, 1845.—(*Continued.*)

Names of Places.	Beginning.	Middle.	End.
	d. h. m.	h. m.	h. m.
Toronto, U. C.	13 5 53	7 32	9 11
Trenton, N. J.	6 12	7 51	9 30
Tuscaloosa, Ala.	5 19	6 58	8 38
University of Virginia, Va.	5 56	7 35	9 14
Washington, D. C.	6 2	7 41	9 20
Worcester, Mass.	6 23	8 2	9 41
Galveston, Texas	4 47	6 26	8 6

TRANSIT OF MERCURY, MAY 8, 1845.

A Transit of the planet Mercury over the Sun's disc will take place on the 8th of May, and will be wholly visible in all parts of the United States. The Ingress, Egress, etc., as they would appear if seen from the Earth's centre, will be as follows:

Ingress.	External contact,.... May 8	4 18 57.2	Mean Time at Greenwich.
	Internal contact,....	4 22 39.2	
Nearest approach of centres,..		7 34 50.6	
Egress.	Internal contact,....	10 47 3.2	
	External contact....	10 50 45.3	

Angle from Sun's North point { First contact 98° 5′ towards the East. Last contact 151 8 towards the West.

Least distance of centres.....9′ 11″ 3.

At Ingress and Egress the Sun will be in the Zenith of the places whose positions are as follows; the longitudes being reckoned from Greenwich:

Ingress.	Egress.
Lon. 65° 41′ W. Lat. 17° 11′ N.	Lon. 163° 37′ W. Lat. 17° 15′ N.

The whole Transit will be visible in all but the North-eastern extremity of North America. The Ingress will be visible in South America, the Western part of Europe, and the North-western part of Africa. The Egress in the North-western part of South America, Australia, and the Eastern part of Asia.

The times of the several phases being sensibly affected by very minute errors in the places of the Sun or planet, cannot be depended on within several seconds. An error in their relative right ascension of only one-tenth of a second of space is sufficient to affect the results to the amount of nearly two seconds of time. The elements employed in computing the phases, etc., of this Transit were taken from Encke's Astronomisches Jarbuch.

This Transit will afford a favourable opportunity for ascertaining the longitudes of places, where means are at hand for observing the phenomenon and determining the true times of contact. The errors arising from the want of a perfectly accurate knowledge of the places of the Sun and planet being very nearly the same for all parts of the Earth, will not sensibly affect the relative longitudes of places deduced from corresponding observations.

The times of Ingress and Egress for the following places have been computed from the constants given on page 95. The angular distance of the points of contact from the Sun's Vertex, are given as seen in an inverting telescope, and reckoned towards the West. The angles from the Sun's Northern point, also for inverted image, are

From North point, { First contact.....81° 5′ towards the West. Last contact.....28 2 towards the East.

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TRANSIT OF MERCURY, MAY 8, 1845.

Names of Places.	Ingress.				Egress.		
	External Contact.	Internal Contact.	First contact from vertex.	Internal contact.	External contact.	*Last contact from vertex.
	d. h. m.	h. m. s.		h. m. s.	h. m. s.	
Albany, N. Y.	May 8 11 24 20m	11 28 2m	68°	5 50 7a	5 53 43a	21°
Annapolis, Md.	11 13 11	11 16 52	62	5 36 59	5 42 40	25
Augusta, Me.	11 39 52	11 43 35	75	6 5 44	6 9 26	18
Baltimore, Md.	11 12 53	11 16 34	62	5 36 41	5 42 22	25
Bangor, Me.	11 44 4	11 47 46	77	6 9 55	6 13 37	17
Boston, Mass.	11 34 58	11 38 41	73	6 0 48	6 4 31	21
Brooklyn, N. Y.	11 23 19	11 27 2	67	5 49 8	5 52 49	22
Buffalo, N. Y.	11 3 47	11 7 29	62	5 29 28	5 33 10	21
Burlington, N. J.	11 19 53	11 23 35	65	5 45 40	5 49 22	23
Cambridge, Mass.	11 34 46	11 38 27	73	6 0 34	6 4 17	21
Charleston, S. C.	10 59 40	11 3 21	48	5 25 27	5 29 9	32
Cincinnati, Ohio,	10 41 48	10 45 31	50	5 7 26	5 11 9	26
Detroit, Mich.	10 47 42	10 51 24	55	5 13 18	5 17 0	22
Dover, Del.	11 17 20	11 21 3	64	5 43 10	5 46 51	24
Frankfort, Ky.	10 40 58	10 44 40	49	5 6 35	5 10 17	27
Germantown, Pa.	11 18 40	11 22 22	65	5 44 28	5 48 10	24
Halifax, Nova Scotia	0 4 37a	0 8 19a	85	6 30 35	6 34 17	17
Harrisburg, Pa.	11 12 4m	11 15 46m	63	5 37 50	5 41 32	24
Hartford, Conn.	11 28 35	11 32 17	72	5 54 23	5 58 5	20
Indianapolis, Ind.	10 35 19	10 39 1	49	5 0 54	5 4 36	25
Jefferson, Missouri	10 11 16	10 14 58	41	4 36 47	4 40 27	27
Lexington, Ky.	10 42 24	10 46 7	49	5 8 2	5 11 45	26
Little Rock, Ark.	10 11 2	10 14 44	30	4 36 35	4 40 17	30
Milledgeville, Ga.	10 46 16	10 49 58	42	5 12 0	5 15 42	31
Mobile, Ala.	10 27 49	10 31 31	32	4 53 28	4 57 10	35
Montpelier, Vt.	11 28 57	11 32 40	72	5 54 42	5 58 24	19
Montreal, L. C.	11 24 58	11 28 40	71	5 50 44	5 54 26	18
Nashville, Tenn.	10 32 24	10 36 6	42	4 58 2	5 1 44	29
Natchez, M'pi.	10 14 11	10 17 53	29	4 39 47	4 43 29	34
New Bedford, Mass.	11 35 29	11 39 11	73	6 1 23	6 5 5	21
New Haven, Conn.	11 27 25	11 31 7	71	5 53 19	5 57 1	22
New Orleans, La.	10 19 51	10 23 33	30	4 45 28	4 49 10	36
Newport, R. I.	11 33 58	11 37 40	72	5 59 51	6 3 33	21
New York, N. Y.	11 23 15	11 26 57	67	5 49 4	5 52 46	22
Norfolk, Va.	11 14 7	11 17 49	60	5 39 57	5 43 39	27
Northampton, Mass.	11 28 45	11 32 27	70	5 54 33	5 58 15	21
Philadelphia, Pa.	11 18 39	11 22 21	65	5 44 27	5 48 9	24
Pittsburg, Pa.	10 59 20	11 3 2	58	5 25 2	5 28 44	24
Portland, Me.	11 37 50	11 41 32	74	6 3 42	6 7 24	19
Portsmouth, N. H.	11 36 9	11 39 51	74	6 2 1	6 5 44	19
Princeton, N. J.	11 20 41	11 24 23	66	5 46 30	5 50 12	23
Providence, R. I.	11 33 36	11 37 19	72	5 59 28	6 3 11	21
Quebec, L. C.	11 34 12	11 37 54	74	5 59 57	6 3 39	16
Raleigh, N. C.	11 4 15	11 7 57	55	5 30 2	5 33 44	28
Richmond Va.	11 9 31	11 13 13	59	5 35 21	5 39 3	26
St. Augustine, Fa.	10 53 12	10 56 54	39	5 19 1	5 22 43	34
St. John's, N. B.	11 55 3	11 58 45	81	6 21 2	6 24 44	17
St. Louis, Missouri.	10 18 50	10 22 32	42	4 44 25	4 48 7	27
Salem, Mass.	11 35 39	11 39 21	73	6 1 30	6 5 12	21
Savannah, Ga.	10 55 1	10 58 43	45	5 20 45	5 24 27	33
Springfield, Ill.	10 21 32	10 25 14	45	4 47 7	4 50 49	25
Springfield, Mass.	11 28 55	11 32 37	70	5 54 43	5 58 25	21
Tallahasse, Fa.	10 41 14	10 44 56	36	5 6 57	5 10 39	35
Toronto, U. C.	11 2 8	11 5 50	62	5 27 48	5 31 30	20
Trenton, N. J.	10 20 43	11 24 25	67	5 46 32	5 50 14	23
Tuscaloosa, Ala.	10 28 56	10 32 38	36	4 54 34	4 58 16	32
University of Virginia,	11 5 19	11 9 1	58	5 31 6	5 34 48	26
Washington, D. C.	11 11 19	11 15 1	62	5 37 5	5 40 47	24
Williamstown, Mass.	11 26 25	11 30 7	70	5 52 13	5 55 55	20
Worcester, Mass.	11 32 3	11 35 44	73	5 57 54	6 1 36	21

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The times of Ingress and Egress and the angles from Vertex, for any place in the United States, may be estimated with sufficient accuracy from those of the nearest place given, making allowance for the difference of longitude.

With the following quantities we may deduce the times of the several phases, for any place on the Earth's surface where the Transit will be visible, from those given for the centre.

		T d.	h. m. s.	λ ° ′ ″	log. sin. β	log. cos. β	log. g.
Ingress.	External contact	8	4 18 57.2	+ 22 22 47	— 9.15981	+ 9.99544	+ 2.10444
	Internal contact		4 22 39.2	+ 21 30 1	— 9.18302	+ 9.99483	+ 2.10720
Egress.	Internal contact		10 47 3.2	+ 135 54 9	— 9.92891	+ 9.72295	+ 2.10810
	External contact		10 50 45.3	+ 134 26 15	— 9.92685	+ 9.72818	+ 2.10538

Formula for Reduction.

$$\cos \zeta = \sin \beta \sin \phi + \cos \beta \cos \phi \cos (\lambda - \omega).$$

$$t = T + \omega \mp g \cos \zeta.$$

In which t is the required Local Mean Time of the phase, ϕ the Latitude of the place, and ω its Longitude from Greenwich. North Latitudes positive, South Latitudes negative. East Longitudes positive, West Longitudes negative. In the equation for t, use the upper sign for Ingress, under sign for Egress. For the angles from Vertex, Direct Image, and reckoned towards the East = V,—

For Ingress.

$$a = [9.9662] \tan \phi$$
$$b = [9.4093] \cos (65^\circ.7 + \omega)$$
$$f \sin Q = \sin (65^\circ.7 + \omega)$$
$$f \cos Q = a - b$$
$$V = 98^\circ.5 - Q$$

For Egress.

$$a = [9.9800] \tan \phi$$
$$b = [9.4663] \cos (163^\circ.7 + \omega)$$
$$f \sin Q = \sin (163^\circ.7 + \omega)$$
$$f \cos Q = a - b$$
$$V = 208^\circ.2 - Q$$

For example: Required the time of last contact and the angle from Vertex for Philadelphia.

For Last Contact.

ϕ	+	39° 57′ 9″
ω	—	75 10 28
λ	+	134 26 15
$\lambda - \omega$	+	209 36 23
log sin β	—	9.9268
log sin ϕ	+	9.8076
log sin β sin ϕ	—	9.7344
log cos β	+	9.7282
log cos ϕ	+	9.8846
log cos $(\lambda - \omega)$	—	9.9394
log cos β cos ϕ cos $(\lambda - \omega)$	—	9.5522
cos β cos ϕ cos $(\lambda - \omega)$	—	.2567
sin β sin ϕ	—	.5425
cos ζ	—	.8992
log cos ζ	—	9.9539
log g	+	2.1053
log g cos ζ	—	2 0592
T		10h 50m 45s.3
in time ω	—	5 0 41 .9
$T + \omega$		5 50 3 .4
g cos ζ	—	1 54 .6
t		5 48 8 .8

For angle V.

ω	—	75.°2
const	+	163.7
163.°7 + ω	+	88.5
const	+	9.8800
log. tun ϕ	+	9.9130
log a	+	9.8930
const	+	9.4663
log cos. (163.°7 + ω)	+	8.4179
log b	+	7.8872
b	+	.0077
a	+	.7816
f cos $Q = a - b$	+	.7739
log sin 88.°5 = log f sin Q	+	9.9999
log f cos Q	+	9.8886
log tun Q	+	0.1113
Q	+	52.°3
const		208 2
Towards East, direct, V		155.9
		180.0
Towards West, inverted, V		24.1

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ELEMENTS FOR DETERMINING THE GEOCENTRIC POSITION, MAGNITUDE, AND APPEARANCE OF SATURN'S RING.

Mean Noon	p	a	b	l	l'
	° ′	″	″	° ′	° ″
Jan. 1	+7 34.4	34.64	+11.09	+18 40.5	+17 47.9
Feb. 10	7 25.6	34.38	9.99	16 53.6	17 22.0
Mar. 22	7 15.3	35.40	9.27	15 11.2	16 55.4
May 1	7 7.5	37.50	9.12	14 4.3	16 28.4
June 10	7 6.1	40.07	9.66	13 57.0	16 1.0
July 20	7 11.6	41.94	10.73	14 49.8	15 33.2
Aug. 29	7 19.4	41.89	11.60	16 4.7	15 4.8
Oct. 8	7 23.6	39.94	11.53	16 46.8	14 36.2
Nov. 17	7 21.7	37.38	10.58	16 26.7	14 7.0
Dec. 27	7 13.6	35.40	9.24	15 8.1	13 37.5
—— 31	+7 12.4	35.26	+ 9.11	+14 57.8	+13 34.5

p denotes the inclination of the Northern semi-minor axis of the Ring to the circle of Declination; + East, — West.
a the *major* axis of the Ring.
b the *minor* axis; + North surface visible.
— South surface visible.
l the elevation of the Earth above the plane of the Ring, as seen from Saturn; + North, — South.
l' the elevation of the Sun above the plane of the Ring, as seen from Saturn; + North, — South.

TABLE,

Showing the Mean Time of the greatest Libration of the Moon's Apparent Disc.

	d.	h.	m.			d.	h.	m.	
Jan.	12	12	46	S. W.	July	11	20	15	S. E.
	27	17	17	S. E.		24	1	53	S. W.
Feb.	9	16	26	S. W.	Aug.	8	16	14	S. E.
	22	21	26	S. E.		21	5	32	S. W.
Mar.	9	9	1	S. W.	Sept.	4	13	45	S. E.
	21	18	5	S. E.		18	3	42	S. W.
Apr.	5	4	22	S. W.		30	20	39	S. E.
	18	10	27	S. E.	Oct.	15	13	28	S. W.
May	1	11	8	S. W.		28	2	0	S. E.
	16	11	50	S. E.	Nov.	10	23	22	S. W.
	28	20	34	S. W.		24	23	55	S. E.
June	13	16	35	S. E.	Dec.	7	13	22	S. W.
	25	21	11	S. W.		23	5	50	S. E.

TABLE,

Showing the Illuminated Portion of the Discs of Venus and Mars.

1845.	Venus.	Mars.
Jan. 15	0.870	0.926
Feb. 14	0.925	0.903
Mar. 15	0.963	0.884
Apr. 15	0.990	0.870
May 15	1.000	0.870
June 15	0.990	0.893
July 15	0.958	0.948
Aug. 15	0.905	0.999
Sept. 15	0.837	0.962
Oct. 15	0.757	0.902
Nov. 15	0.656	0.872
Dec. 15	0.533	0.868

TIDE FACTOR FOR 1845.

From the *Connaissance des Tems* for 1845, page 318.

Mean Time, Washington.					Factor.	Mean Time, Washington.					Factor.
	d.	h.	m.				d.	h.	m.		
Jan.	8	2	5 m.	New Moon,....	1.03	July	4	11	22 m.	New Moon,....	0.75
	24	9	12 m.	Full Moon,....	0.84		19	0	55 m.	Full Moon,....	1.04
Feb.	6	1	27 a.	New Moon,....	1.05	Aug.	3	2	17 m.	New Moon,....	0.82
	22	1	38 m.	Full Moon,....	0.95		17	8	9 m.	Full Moon,....	1.08
March	8	1	28 m.	New Moon,....	1.02	Sept.	1	4	27 a.	New Moon,....	0.91
	23	3	11 a.	Full Moon,....	1.01		15	5	5 a.	Full Moon,....	1.05
April	6	2	32 a.	New Moon,....	0.93	Oct.	1	5	51 m.	New Moon,....	0.97
	22	2	4 m.	Full Moon,....	1.02		15	4	48 m.	Full Moon,....	0.96
May	6	4	49 m.	New Moon,....	0.82		30	6	34 a.	New Moon,....	0.99
	21	10	30 m.	Full Moon,....	1.00	Nov.	13	7	47 a.	Full Moon,....	0.85
June	4	8	0 a.	New Moon,....	0.75		29	6	33 m.	New Moon,....	0.99
	19	6	10 a.	Full Moon,....	1.00	Dec.	13	1	35 a.	Full Moon,....	0.78
							28	5	45 a.	New Moon,....	1.03

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ASTRONOMICAL TABLES.

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TABLE FOR CONVERTING SIDEREAL TIME INTO MEAN SOLAR TIME.

Sidereal Hours.	Correction.	Sidereal Minutes.	Correction.	Sidereal Seconds.	Correction.
h.	m. s.	m.	s.	s.	s.
0	3 47.000	0	10.000	0	3.000
1	3 37.170	1	9.836	1	2.997
2	3 27.341	2	9.672	2	2.996
3	3 17.511	3	9.509	3	2.992
4	3 7.682	4	9.345	4	2.989
5	2 57.852	5	9.181	5	2.986
6	2 48.023	6	9.017	6	2.984
7	2 38.193	7	8.853	7	2.981
8	2 28.364	8	8.689	8	2.978
9	2 18.534	9	8.526	9	2.975
10	2 8.704	10	8.362	10	2.973
11	1 58.875	11	8.198	11	2.970
12	1 49.045	12	8.034	12	2.967
13	1 39.216	13	7.870	13	2.965
14	1 29.386	14	7.706	14	2.962
15	1 19.557	15	7.543	15	2.959
16	1 9.727	16	7.379	16	2.956
17	0 59.898	17	7.215	17	2.954
18	0 50.068	18	7.051	18	2.951
19	0 40.238	19	6.887	19	2.948
20	0 30.409	20	6.723	20	2.945
21	0 20.579	21	6.560	21	2.943
22	0 10.750	22	6.396	22	2.940
23	0 0.920	23	6.232	23	2.937
		24	6.068	24	2.934
		25	5.904	25	2.932
		26	5.741	26	2.929
		27	5.577	27	2.926
		28	5.413	28	2.924
		29	5.249	29	2.921
		30	5.085	30	2.918
		31	4.921	31	2.915
		32	4.758	32	2.913
		33	4.594	33	2.910
		34	4.430	34	2.907
		35	4.266	35	2.904
		36	4.102	36	2.902
		37	3.939	37	2.899
		38	3.775	38	2.896
		39	3.611	39	2.894
		40	3.447	40	2.891
		41	3.283	41	2.888
		42	3.119	42	2.885
		43	2.956	43	2.883
		44	2.792	44	2.880
		45	2.628	45	2.877
		46	2.464	46	2.874
		47	2.300	47	2.872
		48	2.136	48	2.869
		49	1.973	49	2.866
		50	1.809	50	2.863
		51	1.645	51	2.861
		52	1.481	52	2.858
		53	1.317	53	2.855
		54	1.154	54	2.853
		55	0.990	55	2.850
		56	0.826	56	2.847
		57	0.662	57	2.844
		58	0.498	58	2.842
		59	0.334	59	2.839

Daily Retardation of Mean Solar on Sidereal Time	m. s. 3 55.9063	log. 2.3727451
Hourly Retardation of Mean Solar on Sidereal Time	9.82956	log. 0.9995339
Daily Retardation divided by 24 hours.....		log. 7.4362314

TABLE FOR CONVERTING MEAN SOLAR TIME INTO SIDEREAL TIME.

Mean Solar Hours.	Correction.	Mean Solar Minutes.	Correction.	Mean Solar Seconds.	Correction.
h.	m. s.	m.	s.	s.	s.
1	0 9.856	1	0.164	1	0.002
2	0 19.713	2	0.329	2	0.005
3	0 29.569	3	0.493	3	0.008
4	0 39.426	4	0.657	4	0.011
5	0 49.282	5	0.821	5	0.014
6	0 59.139	6	0.986	6	0.016
7	1 8.995	7	1.150	7	0.019
8	1 18.852	8	1.314	8	0.022
9	1 28.708	9	1.478	9	0.025
10	1 38.565	10	1.643	10	0.027
11	1 48.421	11	1.807	11	0.030
12	1 58.278	12	1.971	12	0.033
13	2 8.134	13	2.136	13	0.036
14	2 17.991	14	2.300	14	0.038
15	2 27.847	15	2.464	15	0.041
16	2 37.704	16	2.628	16	0.044
17	2 47.560	17	2.793	17	0.047
18	2 57.417	18	2.957	18	0.049
19	3 7.273	19	3.121	19	0.052
20	3 17.129	20	3.285	20	0.055
21	3 26.986	21	3.450	21	0.057
22	3 36.842	22	3.614	22	0.060
23	3 46.699	23	3.778	23	0.063
24	3 56.555	24	3.943	24	0.066
		25	4.107	25	0.068
		26	4.271	26	0.071
		27	4.435	27	0.074
		28	4.600	28	0.077
		29	4.764	29	0.079
		30	4.928	30	0.082
		31	5.093	31	0.085
		32	5.257	32	0.088
		33	5.421	33	0.090
		34	5.585	34	0.093
		35	5.750	35	0.096
		36	5.914	36	0.099
		37	6.078	37	0.101
		38	6.242	38	0.104
		39	6.407	39	0.107
		40	6.571	40	0.110
		41	6.735	41	0.112
		42	6.900	42	0.115
		43	7.064	43	0.118
		44	7.228	44	0.120
		45	7.392	45	0.123
		46	7.557	46	0.126
		47	7.721	47	0.129
		48	7.885	48	0.131
		49	8.049	49	0.134
		50	8.214	50	0.137
		51	8.378	51	0.140
		52	8.542	52	0.142
		53	8.707	53	0.145
		54	8.871	54	0.148
		55	9.035	55	0.151
		56	9.199	56	0.153
		57	9.364	57	0.156
		58	9.528	58	0.159
		59	9.692	59	0.162
		60	9.856	60	0.164

Daily Acceleration of Sidereal on Mean Solar Time	m. s. 3 56.5554	log. 2.3739329
Hourly Acceleration of Sidereal on Mean Solar Time	9.85648	log. 0.9937217
Daily Acceleration divided by 24 hours		log. 7.4374192

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SPACE INTO TIME.

To convert parts of the Equator in Arc into Sidereal Time, or to convert Terrestrial Longitude in Arc into Time.

Arc.	Time.	Arc.	Time.	Arc.	Time.	Arc.	Time.	Arc.	Time.	Arc.	Time.	Arc.	Time.	Arc.	Time.
°	h. m.	°	h. m.	°	h. m.	°	h. m.	°	h. m.	°	h. m.	′	m. s.	″	s.
1	0 4	61	4 4	121	8 04	181	12 4	241	16 4	301	20 4	1	0 4	1	0.067
2	0 8	62	4 8	122	8 8	182	12 8	242	16 8	302	20 8	2	0 8	2	0.133
3	0 12	63	4 12	123	8 12	183	12 12	243	16 12	303	20 12	3	0 12	3	0.200
4	0 16	64	4 16	124	8 16	184	12 16	244	16 16	304	20 16	4	0 16	4	0.267
5	0 20	65	4 20	125	8 20	185	12 20	245	16 20	305	20 20	5	0 20	5	0.333
6	0 24	66	4 24	126	8 24	186	12 24	246	16 24	306	20 24	6	0 24	6	0.400
7	0 28	67	4 28	127	8 28	187	12 28	247	16 28	307	20 28	7	0 28	7	0.467
8	0 32	68	4 32	128	8 32	188	12 32	248	16 32	308	20 32	8	0 32	8	0.533
9	0 36	69	4 36	129	8 36	189	12 36	249	16 36	309	20 36	9	0 36	9	0.600
10	0 40	70	4 40	130	8 40	190	12 40	250	16 40	310	20 40	10	0 40	10	0.667
11	0 44	71	4 44	131	8 44	191	12 44	251	16 44	311	20 44	11	0 44	11	0.733
12	0 48	72	4 48	132	8 48	192	12 48	252	16 48	312	20 48	12	0 48	12	0.800
13	0 52	73	4 52	133	8 52	193	12 52	253	16 52	313	20 52	13	0 52	13	0.867
14	0 56	74	4 56	134	8 56	194	12 56	254	16 56	314	20 56	14	0 56	14	0.933
15	1 0	75	5 0	135	9 0	195	13 0	255	17 0	315	21 0	15	1 0	15	1.000
16	1 4	76	5 4	136	9 4	196	13 4	256	17 4	316	21 4	16	1 4	16	1.067
17	1 8	77	5 8	137	9 8	197	13 8	257	17 8	317	21 8	17	1 8	17	1.133
18	1 12	78	5 12	138	9 12	198	13 12	258	17 12	318	21 12	18	1 12	18	1.200
19	1 16	79	5 16	139	9 16	199	13 16	259	17 16	319	21 16	19	1 16	19	1.267
20	1 20	80	5 20	140	9 20	200	13 20	260	17 20	320	21 20	20	1 20	20	1.333
21	1 24	81	5 24	141	9 24	201	13 24	261	17 24	321	21 24	21	1 24	21	1.400
22	1 28	82	5 28	142	9 28	202	13 28	262	17 28	322	21 28	22	1 28	22	1.467
23	1 32	83	5 32	142	9 32	203	13 32	263	17 32	323	21 32	23	1 32	23	1.533
24	1 36	84	5 36	144	9 36	204	13 36	264	17 36	324	21 36	24	1 36	24	1.600
25	1 40	85	5 40	145	9 40	205	13 40	265	17 40	325	21 40	25	1 40	25	1.667
26	1 44	86	5 44	146	9 44	206	13 44	266	17 44	326	21 44	26	1 44	26	1.733
27	1 48	87	5 48	147	9 48	207	13 48	267	17 48	327	21 48	27	1 48	27	1.800
28	1 52	88	5 52	148	9 52	208	13 52	268	17 52	328	21 52	28	1 52	28	1.867
29	1 56	89	5 56	149	9 56	209	13 56	269	17 56	329	21 56	29	1 56	29	1.933
30	2 0	90	6 0	150	10 0	210	14 0	270	18 0	330	22 0	30	2 0	30	2.000
31	2 4	91	6 4	151	10 4	211	14 4	271	18 4	331	22 4	31	2 4	31	2.067
32	2 8	92	6 8	152	10 8	212	14 8	272	18 8	332	22 8	32	2 8	32	2.133
33	2 12	93	6 12	153	10 12	213	14 12	273	18 12	333	22 12	33	2 12	33	2.200
34	2 16	94	6 16	154	10 16	214	14 16	274	18 16	334	22 16	34	2 16	34	2.267
35	2 20	95	6 20	155	10 20	215	14 20	275	18 20	335	22 20	35	2 20	35	2.333
36	2 24	96	6 24	156	10 24	216	14 24	276	18 24	336	22 24	36	2 24	36	2.400
37	2 28	97	6 28	157	10 28	217	14 28	277	18 28	337	22 28	37	2 28	37	2.467
38	2 32	98	6 32	158	10 32	218	14 32	278	18 32	338	22 32	38	2 32	38	2.533
39	2 36	99	6 36	159	10 36	219	14 36	279	18 36	339	22 36	39	2 36	39	2.600
40	2 40	100	6 40	160	10 40	220	14 40	280	18 40	340	22 40	40	2 40	40	2.667
41	2 44	101	6 44	161	10 44	221	14 44	281	18 44	341	22 44	41	2 44	41	2.733
42	2 48	102	6 48	162	10 48	222	14 48	282	18 48	342	22 48	42	2 48	42	2.800
43	2 52	103	6 52	163	10 52	223	14 52	283	18 52	343	22 52	43	2 52	43	2.867
44	2 56	104	6 56	164	10 56	224	14 56	284	18 56	344	22 56	44	2 56	44	2.933
45	3 0	105	7 0	165	11 0	225	15 0	285	19 0	345	23 0	45	3 0	45	3.000
46	3 4	106	7 4	166	11 4	226	15 4	286	19 4	346	23 4	46	3 4	46	3.067
47	3 8	107	7 8	167	11 8	227	15 8	287	19 8	347	23 8	47	3 8	47	3.133
48	3 12	108	7 12	168	11 12	228	15 12	288	19 12	348	23 12	48	3 12	48	3.200
49	3 16	109	7 16	169	11 16	229	15 16	289	19 16	349	23 16	49	3 16	49	3.267
50	3 20	110	7 20	170	11 20	230	15 20	290	19 20	350	23 20	50	3 20	50	3.333
51	3 24	111	7 24	171	11 24	231	15 24	291	19 24	351	23 24	51	3 24	51	3.400
52	3 28	112	7 28	172	11 28	232	15 28	292	19 28	352	23 28	52	3 28	52	3.467
53	3 32	113	7 32	173	11 32	233	15 32	293	19 32	353	23 32	53	3 32	53	3.533
54	3 36	114	7 36	174	11 36	234	15 36	294	19 36	354	23 36	54	3 36	54	3.600
55	3 40	115	7 40	175	11 40	235	15 40	295	19 40	355	23 40	55	3 40	55	3.667
56	3 44	116	7 44	176	11 44	236	15 44	296	19 44	356	23 44	56	3 44	56	3.733
57	3 48	117	7 48	177	11 48	237	15 48	297	19 48	357	23 48	57	3 48	57	3.800
58	3 52	118	7 52	178	11 52	238	15 52	298	19 52	358	23 52	58	3 52	58	3.867
58	3 56	119	7 56	179	11 56	239	15 56	299	19 56	359	23 56	59	3 56	59	3.933
60	4 0	120	8 0	180	12 0	240	16 0	300	20 0	360	24 0	60	4 0	60	4.000

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TIME INTO SPACE.

To convert Sidereal Time into parts of the Equator in Arc, or to convert Time into Terrestrial Longitude in Arc.

Time.	Arc.	Time.	Arc.	Time.	Arc.	Time.	Arc.	Time.	Arc.
h.	°	m.	° ′	s.	′ ″	s.	″	s.	″
1	15	1	0 15	1	0 15	0.01	0.15	0.60	9.00
2	30	2	0 30	2	0 30	0.02	0.30	0.61	9.15
3	45	3	0 45	3	0 45	0.03	0.45	0.62	9.30
4	60	4	1 0	4	1 0	0.04	0.60	0.63	9.45
5	75	5	1 15	5	1 15	0.05	0.75	0.64	9.60
6	90	6	1 30	6	1 30	0.06	0.90	0.65	9.75
7	105	7	1 45	7	1 45	0.07	1.05	0.66	9.90
8	120	8	2 0	8	2 0	0.08	1.20	0.67	10.05
9	135	9	2 15	9	2 15	0.09	1.35	0.68	10.20
10	150	10	2 30	10	2 30	0.10	1.50	0.69	10.35
11	165	11	2 45	11	2 45	0.11	1.65	0.70	10.50
12	180	12	3 0	12	3 0	0.12	1.80	0.71	10.65
13	195	13	3 15	13	3 15	0.13	1.95	0.72	10.80
14	210	14	3 30	14	3 30	0.14	2.10	0.73	10.95
15	225	15	3 45	15	3 45	0.15	2.25	0.74	11.10
16	240	16	4 0	16	4 0	0.16	2.40	0.75	11.25
17	255	17	4 15	17	4 15	0.17	2.55	0.76	11.40
18	270	18	4 30	18	4 30	0.18	2.70	0.77	11.55
19	285	19	4 45	19	4 45	0.19	2.85	0.78	11.70
20	300	20	5 0	20	5 0	0.20	3.00	0.79	11.85
21	315	21	5 15	21	5 15	0.21	3.15	0.80	12.00
22	330	22	5 30	22	5 30	0.22	3.30	0.81	12.15
23	345	23	5 45	23	5 45	0.23	3.45	0.82	12.30
24	360	24	6 0	24	6 0	0.24	3.60	0.83	12.45
		25	6 15	25	6 15	0.25	3.75	0.84	12.60
		26	6 30	26	6 30	0.26	3.90	0.85	12.75
		27	6 45	27	6 45	0.27	4.05	0.86	12.90
		28	7 0	28	7 0	0.28	4.20	0.87	13.05
		29	7 15	29	7 15	0.29	4.35	0.88	13.20
		30	7 30	30	7 30	0.30	4.50	0.89	13.35
		31	7 45	31	7 45	0.31	4.65	0.90	13.50
		32	8 0	32	8 0	0.32	4.80	0.91	13.65
		33	8 15	33	8 15	0.33	4.95	0.92	13.80
		34	8 30	34	8 30	0.34	5.10	0.93	13.95
		35	8 45	35	8 45	0.35	5.25	0.94	14.10
		36	9 0	36	9 0	0.36	5.40	0.95	14.25
		37	9 15	37	9 15	0.37	5.55	0.96	14.40
		38	9 30	38	9 30	0.38	5.70	0.97	14.55
		39	9 45	39	9 45	0.39	5.85	0.98	14.70
		40	10 0	40	10 0	0.40	6.00	0.99	14.85
		41	10 15	41	10 15	0.41	6.15	1.00	15.00
		42	10 30	42	10 30	0.42	6.30		
		43	10 45	43	10 45	0.43	6.45		
		44	11 0	44	11 0	0.44	6.60		
		45	11 15	45	11 15	0.45	6.75		
		46	11 30	46	11 30	0.46	6.90		
		47	11 45	47	11 45	0.47	7.05		
		48	12 0	48	12 0	0.48	7.20		
		49	12 15	49	12 15	0.49	7.35		
		50	12 30	50	12 30	0.50	7.50		
		51	12 45	51	12 45	0.51	7.65		
		52	13 0	52	13 0	0.52	7.80		
		53	13 15	53	13 15	0.53	7.95		
		54	13 30	54	13 30	0.54	8.10		
		55	13 45	55	13 45	0.55	8.25		
		56	14 0	56	14 0	0.56	8.40		
		57	14 15	57	14 15	0.57	8.55		
		58	14 30	58	14 30	0.58	8.70		
		59	14 45	59	14 45	0.59	8.85		
		60	15 0	60	15 0	0.60	9.00		

Thousandths of Seconds of Time.	Arc.
	″
.001	0.015
.002	0.030
.003	0.045
.004	0.060
.005	0.075
.006	0.090
.007	0.105
.008	0.120
.009	0.135
.010	0.150

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MEAN REFRACTIONS.

Fahrenheit's Thermometer 50.° Barometer 30 inches.

Z. D.	r	Log. r.	Diff.	Z. D.	r	Log. r.	Diff.	Z. D.	r	Log. r.	Diff.
° ′	′ ″			° ′	′ ″			° ′	′ ″		
0 0	0 0.00	0.0000		10 0	0 10 30	1.0129	72	20 0	0 21.26	1.3277	38
10	0.17	9.2304	3011	10	10.47	1.0201	72	10	21.45	1.3315	39
20	0.34	9.5315	1761	20	10.65	1.0273	71	20	21.65	1.3354	39
30	0.51	9.7076	1249	30	10.82	1.0344	70	30	22.84	1.3393	38
40	0.68	9.8325	969	40	11.00	1.0414	69	40	22.03	1.3431	38
50	0.85	9.9294	791	50	11.17	1.0483	69	50	22.23	1.3469	38
1 0	0 1.02	0.0085	670	11 0	0 11.35	1.0552	66	21 0	0 22.42	1.3507	37
10	1.19	0.0755	580	10	11.53	1.0618	66	10	22.62	1.3544	38
20	1.36	0.1335	512	20	11.71	1.0684	66	20	22.81	1.3582	37
30	1.53	0.1847	457	30	11.89	1.0750	65	30	23.01	1.3619	37
40	1.70	0.2304	414	40	12.06	1.0815	64	40	23.21	1.3656	37
50	1.87	0.2718	379	50	12.24	1.0879	62	50	23.40	1.3693	36
2 0	0 2.04	0.3097	347	12 0	0 12.42	1.0941	62	22 0	0 23.60	1.3729	37
10	2.21	0.3444	322	10	12.60	1.1003	61	10	23.80	1.3766	36
20	2.38	0.3766	301	20	12.78	1.1064	60	20	24.00	1.3802	36
30	2.55	0.4067	280	30	12.95	1.1124	60	30	24.20	1.3838	36
40	2.72	0.4347	263	40	13.13	1.1184	58	40	24.40	1.3874	35
50	2.89	0.4610	250	50	13.31	1.1242	58	50	24.60	1.3909	36
3 0	0 3.06	0.4860	235	13 0	0 13.49	1.1300	57	23 0	0 24.80	1.3945	36
10	3.23	0.5095	224	10	13.67	1.1357	57	10	25.00	1.3981	34
20	3.40	0.5319	211	20	13.85	1.1414	55	20	25.20	1.4015	34
30	3.57	0.5530	203	30	14.02	1.1469	55	30	25.41	1.4049	35
40	3.74	0.5733	193	40	14.20	1.1524	54	40	25.61	1.4084	34
50	3.91	0.5926	186	50	14.38	1.1578	54	50	25.81	1.4118	33
4 0	0 4.08	0.6112	178	14 0	0 14.56	1.1632	54	24 0	0 26.01	1.4151	34
10	4.26	0.6290	171	10	14.74	1.1686	54	10	26.21	1.4185	34
20	4.43	0.6461	165	20	14.93	1.1740	53	20	26.42	1.4219	34
30	4.60	0.6626	158	30	15.11	1.1793	52	30	26.62	1.4253	33
40	4.77	0.6784	153	40	15.29	1.1845	52	40	26.83	1.4286	33
50	4.94	0.6937	149	50	15.48	1.1897	50	50	27.03	1.4319	33
5 0	0 5.11	0.7086	142	15 0	0 15.66	1.1947	51	25 0	0 27.24	1.4352	33
10	5.28	0.7228	139	10	15.84	1.1998	50	10	27.45	1.4385	33
20	5.45	0.7367	135	20	16.03	1.2048	50	20	27.66	1.4418	33
30	5.63	0.7502	131	30	16.21	1.2098	49	30	27.86	1.4451	32
40	5.80	0.7633	127	40	16.39	1.2147	48	40	28.07	1.4483	32
50	5.97	0.7760	122	50	16.58	1.2195	46	50	28.28	1.4515	32
6 0	0 6.14	0.7882	120	16 0	0 16.75	1.2241	46	26 0	0 28.49	1.4547	32
10	6.31	0.8002	116	10	16.93	1.2287	47	10	28.70	1.4579	32
20	6.48	0.8118	114	20	17.12	1.2334	46	20	28.91	1.4611	32
30	6.66	0.8232	111	30	17.30	1.2380	46	30	29.13	1.4643	31
40	6.83	0.8343	108	40	17.48	1.2426	46	40	29.34	1.4674	32
50	7.00	0.8451	106	50	17.67	1.2472	47	50	29.55	1.4706	30
7 0	0 7.17	0.8557	102	17 0	0 17.86	1.2519	45	27 0	0 29.76	1.4736	32
10	7.34	0.8659	101	10	18.05	1.2564	45	10	29.97	1.4768	31
20	7.52	0.8760	99	20	18.23	1.2609	44	20	30.19	1.4799	30
30	7.69	0.8859	97	30	18.42	1.2653	44	30	30.40	1.4829	31
40	7.86	0.8956	95	40	18.61	1.2697	43	40	30.62	1.4860	30
50	8.04	0.9051	93	50	18.79	1.2740	44	50	30.83	1.4890	31
8 0	0 8.21	0.9144	90	18 0	0 18.98	1.2784	42	28 0	0 31.05	1.4921	31
10	8.38	0.9234	89	10	19.17	1.2826	42	10	31.27	1.4952	30
20	8.56	0.9323	87	20	19.17	1.2868	42	20	31.49	1.4982	31
30	8.73	0.9410	85	30	19.36	1.2910	42	30	31.72	1.5013	30
40	8.90	0.9495	84	40	19.55	1.2952	42	40	31.94	1.5043	30
50	9.08	0.9579	84	50	19.92	1.2994	42	50	32.16	1.5073	29
9 0	0 9.25	0.9663	80	19 0	0 20.11	1.3036	39	29 0	0 32.38	1.5102	31
10	9.42	0.9743	80	10	20.30	1.3075	39	10	32.60	1.5133	29
20	9.60	0.9823	78	20	20.49	1.3116	41	20	32.83	1.5162	30
30	9.77	0.9901	77	30	20.69	1.3157	41	30	33.05	1.5192	29
40	9.95	0.9978	76	40	20.88	1.3197	40	40	33.27	1.5221	29
50	10.12	1.0054	75	50	21.07	1.3237	40	50	33.50	1.5250	29
10 0	10.30	1.0129	72	20 0	21.26	1.3277	38	30 0	33.72	1.5279	29

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MEAN REFRACTIONS.

Fahrenheit's Thermometer 50°. Barometer 30 inches.

Z. D.	r	Log. r.	Diff.	Z. D.	r	Log. r.	Diff.	Z. D.	r	Log. r.	Diff.
° ′	′ ″			° ′	′ ″			° ′	′ ″		
30 0	0 33.72	1.5279	29	40 0	0 48.99	1.69010	257	50 0	1 9.52	1.84208	256
10	33.95	1.5308	29	10	49.28	1.69267	256	10	9.94	1.84464	257
20	34.18	1.5337	29	20	49.58	1.69523	257	20	10.35	1.84721	256
30	34.40	1.5366	29	30	49.87	1.69780	257	30	10.77	1.84977	257
40	34.63	1.5395	29	40	50.16	1.70037	256	40	11.19	1.85234	256
50	34.86	1.5423	29	50	50.46	1.70293	257	50	11.60	1.85490	257
31 0	0 35 09	1.5452	29	41 0	0 50.75	1.70550	254	51 0	1 12.02	1.85747	258
10	35.32	1 5481	29	10	51.06	1.70804	254	10	12.46	1.86005	259
20	35.56	1.5510	28	20	51.36	1.71058	253	20	12.89	1.86264	258
30	35.79	1.5538	28	30	51.66	1.71311	253	30	13.33	1.86522	259
40	36.02	1.5566	28	40	51.96	1.71564	254	40	13.77	1.86781	258
50	36.26	1.5594	28	50	52.27	1.71818	252	50	14.20	1.87039	259
32 0	0 36.49	1.5622	28	42 0	0 52.57	1.72070	252	52 0	1 14.64	1.87298	260
10	36.73	1.5650	28	10	52.88	1.72322	252	10	15.10	1.87558	261
20	36.97	1.5678	29	20	53.19	1.72574	252	20	15.55	1.87819	261
30	37.21	1.5707	28	30	53.50	1.72826	252	30	16.01	1.88080	261
40	37.45	1.5735	27	40	53.81	1.73078	251	40	16.47	1.88341	260
50	37.69	1.5762	28	50	54.12	1.73329	251	50	16.92	1.88601	262
33 0	0 37.93	1.5790	28	43 0	0 54.43	1.73580	253	53 0	1 17.38	1.88863	262
10	38.17	1.5818	27	10	54.75	1.73833	254	10	17.86	1.89125	262
20	38.42	1.5845	28	20	55.07	1.74087	253	20	18.33	1.89387	263
30	38.66	1.5873	27	30	55.40	1.74340	253	30	18.81	1.89650	263
40	38.90	1.5900	27	40	55.72	1.74593	254	40	19.29	1.89913	263
50	39.15	1.5927	27	50	56.04	1.74847	253	50	19.76	1.90176	264
34 0	0 39.39	1.5954	27	44 0	0 56.35	1.75100	252	54 0	1 20.24	1.90440	265
10	39.64	1.5981	28	10	56.68	1.75352	252	10	20.74	1.90705	265
20	39.89	1.6009	27	20	57.02	1.75604	252	20	21.24	1.90970	266
30	40.14	1.6036	27	30	57.35	1.75856	252	30	21.75	1.91236	266
40	40.39	1.6063	27	40	57.69	1.76108	252	40	22.25	1.91502	267
50	40.64	1.6090	25	50	58.02	1.76360	251	50	22.75	1.91769	267
35 0	0 40.89	1.6116	27	45 0	0 58.36	1.76611	252	55 0	1 23.25	1.92036	268
10	41.14	1.6143	27	10	58.70	1 76863	252	10	23.78	1.92304	269
20	41.40	1.6170	27	20	59.05	1.77115	252	20	24.30	1.92573	268
30	41.65	1.6197	26	30	59.39	1.77367	252	30	24.83	1.92841	271
40	41.91	1.6223	27	40	59.74	1.77619	252	40	25.36	1.93112	270
50	42.16	1.6250	26	50	1 0.08	1.77871	252	50	25.88	1.93382	270
36 0	0 42.42	1.6276	27	46 0	1 0.43	1.78123	252	56 0	1 26.41	1.93653	271
10	42.68	1.6303	27	10	0.79	1.78375	253	10	26.96	1.93924	272
20	42.95	1.6330	26	20	1.15	1.78628	252	20	27.52	1.94196	273
30	43.21	1.6356	26	30	1.50	1.78880	252	30	28.07	1.94469	273
40	43.47	1.6382	26	40	1 86	1.79132	253	40	28.62	1.94742	274
50	43 74	1.6408	27	50	2.21	1.79385	252	50	29.18	1.95016	275
37 0	0 44.00	1.6435	26	47 0	1 2.57	1.79637	253	57 0	1 29.73	1.95291	275
10	44.27	1.6461	26	10	2 94	1.79890	253	10	30.31	1.95566	277
20	44.54	1.6487	26	20	3.31	1.80143	253	20	30.90	1.95843	277
30	44.80	1.6513	26	30	3.69	1.80396	253	30	31.48	1.96120	278
40	45.07	1.6539	26	40	4.06	1.80649	253	40	32.06	1.96397	279
50	45.34	1.6565	26	50	4.43	1.80902	253	50	32.65	1.96676	279
38 0	0 45.61	1.6591	29	48 0	1 4.80	1.81155	254	58 0	1 33.23	1.96955	280
10	45.89	1.6617	26	10	5.18	1.81409	254	10	33.85	1.97235	281
20	46.16	1.6643	26	20	5.57	1.81663	253	20	34.46	1.97516	281
30	46.44	1.6669	26	30	5.95	1.81916	254	30	35.08	1.97797	283
40	46.72	1.6695	26	40	6.34	1.82170	254	40	35.70	1.98080	282
50	46.99	1.6720	26	50	6.72	1.82424	254	50	36.31	1.98362	284
39 0	0 47 27	1.6746	26	49 0	1 7.11	1.82678	255	59 0	1 36.93	1.98646	285
10	47.56	1.6772	26	10	7.51	1.82933	255	10	37.58	1.98931	285
20	47.84	1.6798	26	20	7.91	1 83188	255	20	38.24	1.99216	287
30	48.13	1.6824	26	30	8.32	1.83443	255	30	38.89	1.99503	287
40	48.42	1.6850	26	40	8.72	1.83698	255	40	39.54	1.99790	289
50	48.70	1.6876	25	50	9.12	1.83953	255	50	40.20	2.00079	289
40 0	48.99	1.6901	26	50 0	9.52	1.84208	256	60 0	40.85	2.00368	290

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MEAN REFRACTIONS:

Fahrenheit's Thermometer 50°. Barometer 30 inches.

Z. D.	r	Log. r.	Diff.	Z. D.	r	Log. r.	Diff.	Z. D.	r	Log. r.	Diff.
° ′	′ ″			° ′	′ ″			° ′	′ ″		
60 0	1 40.85	2.00368	290	70 0	2 39.16	2.20185	388	80 0	5 20.19	2.50541	696
10	41.52	2.00658	291	10	40.59	2.20573	390	10	25.86	2.51237	707
20	42.21	2.00949	292	20	42.04	2.20963	393	20	30.70	2.51944	716
30	42.90	2.01241	293	30	43.52	2.21356	396	30	36.20	2.52660	727
40	43.59	2.01535	294	40	45.02	2.21752	398	40	41.88	2.53387	738
50	44.30	2.01829	295	50	46.53	2.22150	402	50	47.74	2.54125	749
61 0	1 45.01	2.02124	296	71 0	2 48.08	2.22552	404	81 0	5 53.79	2.54874	759
10	45.73	2.02420	298	10	49.65	2.22956	407	10	6 0.04	2.55635	772
20	46.46	2.02718	299	20	51.25	2.23363	410	20	6.50	2.56407	785
30	47.18	2.03016	300	30	52.87	2.23773	413	30	13.18	2.57192	797
40	47.93	2.03316	301	40	54.53	2.24186	417	40	20.09	2.57989	811
50	48.68	2.03617	301	50	56.21	2.24603	419	50	27.26	2.58800	824
62 0	1 49.44	2.03918	303	72 0	2 57.92	2.25022	423	82 0	6 34.68	2.59624	838
10	50.21	2.04221	304	10	59.66	2.25445	425	10	42.37	2.60462	851
20	50.99	2.04525	305	20	3 1.43	2.25870	429	20	50.33	2.61313	866
30	51.77	2.04830	307	30	3.23	2.26299	433	30	58.59	2.62179	883
40	52.57	2.05137	308	40	5.06	2.26732	436	40	7 7.19	2.63062	899
50	53.36	2.05445	309	50	6.93	2.27168	440	50	16.13	2.63961	914
63 0	1 54.17	2.05754	310	73 0	3 8.83	2.27608	443	83 0	7 25.40	2.64875	931
10	54.99	2.06064	312	10	10.77	2.28051	447	10	35.05	2.65806	949
20	55.81	2.06376	312	20	12.74	2.28498	450	20	45.10	2.66755	967
30	56.66	2.06688	315	30	14.75	2.28948	454	30	55.58	2.67722	986
40	57.50	2.07003	315	40	16.80	2.29402	458	40	8 6.50	2.68708	1006
50	58.36	2.07318	317	50	18.88	2.29860	462	50	17.90	2.69714	1026
64 0	1 59.22	2.07635	318	74 0	3 21.01	2.30322	467	84 0	8 29.80	2.70740	1047
10	2 0.09	2.07953	320	10	23.18	2.30789	470	10	42.24	2.71787	1069
20	0.99	2.08273	321	20	25.39	2.31259	475	20	55.25	2.72856	1092
30	1.88	2.08594	323	30	27.66	2.31734	479	30	9 8.88	2.73948	1115
40	2.80	2.08917	324	40	29.95	2.32213	483	40	23.16	2.75063	1139
50	3.71	2.09241	326	50	32.30	2.32696	488	50	38.12	2.76202	1165
65 0	2 4.65	2.09567	327	75 0	3 34.70	2.33184	493	85 0	9 53.84	2.77367	1191
10	5.59	2.09894	330	10	37.16	2.33677	497	10	10 10.35	2.78558	1219
20	6.54	2.10224	330	20	39.65	2.34174	502	20	27.73	2.79777	1248
30	7.51	2.10554	332	30	42.21	2.34676	507	30	46.03	2.81025	1277
40	8.49	2.10886	334	40	44.82	2.35183	512	40	11 5.30	2.82302	1309
50	9.48	2.11220	335	50	47.48	2.35695	517	50	25.66	2.83611	1340
66 0	2 10.48	2.11555	337	76 0	3 50.21	2.36212	523	86 0	11 47.15	2.84951	1374
10	11.50	2.11892	339	10	53.00	2.36735	528	10	12 9.88	2.86325	1410
20	12.52	2.12231	340	20	55.85	2.37263	533	20	33.97	2.87735	1447
30	13.57	2.12571	342	30	58.76	2.37796	538	30	59.51	2.89182	1484
40	14.62	2.12913	345	40	4 1.74	2.38334	545	40	13 26.61	2.90666	1523
50	15.70	2.12258	345	50	4.79	2.38879	551	50	55.40	2.92189	1565
67 0	2 16.78	2.13603	348	77 0	4 7.91	2.39430	557	87 0	14 26.04	2.93754	1608
10	17.88	2.13951	349	10	11.11	2.39987	563	10	58.71	2.95362	1654
20	19.00	2.14300	352	20	14.39	2.40550	569	20	15 33.60	2.97016	1701
30	20.13	2.14652	354	30	17.74	2.41119	576	30	16 10.89	2.98717	1749
40	21.28	2.15006	355	40	21.19	2.41695	583	40	50.8	3.00466	1801
50	22.43	2.15361	358	50	24.72	2.42278	589	50	17 33.6	3.02267	1855
68 0	2 23.61	2.15719	359	78 0	4 28.33	2.42867	596	88 0	18 19.6	3.04122	1909
10	24.81	2.16078	362	10	32.04	2.43463	603	10	19 9.0	3.06031	1967
20	26.02	2.16440	364	20	35.84	2.44066	611	20	20 2.2	3.07998	2026
30	27.25	2.16804	366	30	39.75	2.44677	618	30	59.6	3.10024	2089
40	28.50	2.17171	368	40	43.76	2.45295	626	40	22 1.7	3.12113	2155
50	29.76	2.17539	371	50	47.88	2.45921	635	50	23 8.9	3.14268	2221
69 0	2 31.04	2.17910	373	79 0	4 52.12	2.46556	642	89 0	24 21.8	3.16489	2290
10	32.34	2.18283	375	10	56.47	2.47198	650	10	25 40.9	3.18779	2361
20	33.67	2.18658	378	20	5 0.94	2.47848	659	20	27 7.1	3.21140	2434
30	35.01	2.19036	381	30	5.54	2.48507	669	30	28 40.8	3.23574	2509
40	36.37	2.19417	383	40	10 28	2.49176	677	40	30 23.2	3.26083	2584
50	37 76	2.19800	385	50	15.16	2.49853	688	50	32 15.0	3.28667	2667
70 0	39.16	2.20185	388	80 0	20.19	2.50541	696	90 0	34 17.5	3.31334	

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Corrections, depending on the state of the Thermometer and Barometer, to be applied to the foregoing Mean Refractions.

External Thermometer.

Th.	Log. t.	P. P.	Th.	Log. t.	P. P.
10°	0.03779	—	50°	0.00000	—
1	0.03689	10	1	9.99910	9
2	0.03582	20	2	9.99820	18
3	0.03484	29	3	9.99730	27
4	0.03386	39	4	9.99640	36
5	0.03288	49	5	9.99550	45
6	0.03191	59	6	9.99460	54
7	0.03094	69	7	9.99371	63
8	0.02997	78	8	9.99282	72
9	0.02900	88	9	9.99193	81
20	0.02803		60	9.99104	
1	0.02706	10	1	9.99016	9
2	0.02609	19	2	9.98927	18
3	0.02514	29	3	9.98839	26
4	0.02418	38	4	9.98751	35
5	0.02323	48	5	9.98663	44
6	0.02227	58	6	9.98575	53
7	0.02132	67	7	9.98488	62
8	0.02037	77	8	9.98401	70
9	0.01942	86	9	9.98314	79
30	0.01848		70	9.98227	
1	0.01754	9	1	9.98140	9
2	0.01660	19	2	9.98054	17
3	0.01566	28	3	9.97967	26
4	0.01472	38	4	9.97881	34
5	0.01379	47	5	9.97795	43
6	0.01285	56	6	9.97709	52
7	0.01192	66	7	9.97623	60
8	0.01099	75	8	9.97537	69
9	0.01006	85	9	9.97452	77
40	0.00914		80	9.97367	
1	0.00822	9	1	9.97282	8
2	0.00730	18	2	9.97197	17
3	0.00638	28	3	9.97112	25
4	0.00546	37	4	9.97027	34
5	0.00455	46	5	9.96943	42
6	0.00363	55	6	9.96859	50
7	0.00272	64	7	9.96775	59
8	0.00181	74	8	9.96691	67
9	0.00090	83	9	9.96607	76
50	0.00000		90	9.96524	

Barometer.

Bar.	Log. β	P. P.
27.5	9.96221	
6	9.96379	
7	9.96536	
8	9.96692	
9	9.96848	
28.0	9.97004	+
1	9.97158	15
2	9.97313	30
3	9.97466	46
4	9.97620	61
5	9.97772	76
6	9.97924	91
7	9.98076	106
8	9.98227	122
9	9.98378	137
29.0	9.98528	
1	9.98677	15
2	9.98826	29
3	9.98975	44
4	9.99123	59
5	9.99270	73
6	9.99417	88
7	9.99563	103
8	9.99709	118
9	9.99855	132
30.0	0.00000	
1	0.00145	14
2	0.00289	29
3	0.00432	43
4	0.00575	57
5	0.00718	71
6	0.00860	86
7	0.01002	100
8	0.01143	114
9	0.01284	129
31.0	0.01424	

Internal Thermometer.

Th.	Log. τ	Th.	Log. τ
10°	0.00173	50°	0.00000
11	0.00169	51	9.99996
12	0.00164	52	9.99991
13	0.00160	53	9.99987
14	0.00156	54	9.99983
15	0.00151	55	9.99978
16	0.00147	56	9.99974
17	0.00143	57	9.99970
18	0.00138	58	9.99965
19	0.00134	59	9.99961
20	0.00130	60	9.99957
21	0.00126	61	9.99953
22	0.00121	62	9.99948
23	0.00117	63	9.99944
24	0.00113	64	9.99940
25	0.00108	65	9.99935
26	0.00104	66	9.99931
27	0.00100	67	9.99927
28	0.00095	68	9.99922
29	0.00091	69	9.99918
30	0.00087	70	9.99913
31	0.00083	71	9.99909
32	0.00078	72	9.99904
33	0.00074	73	9.99900
34	0.00070	74	9.99896
35	0.00065	75	9.99891
36	0.00061	76	9.99887
37	0.00057	77	9.99883
38	0.00052	78	9.99878
39	0.00048	79	9.99874
40	0.00043	80	9.99870
41	0.00039	81	9.99866
42	0.00034	82	9.99861
43	0.00030	83	9.99857
44	0.00026	84	9.99853
45	0.00021	85	9.99848
46	0.00017	86	9.99844
47	0.00013	87	9.99840
48	0.00008	88	9.99835
49	0.00004	89	9.99831
50	0.00000	90	9.99827

P. P. to tenths of a Degree.

	.1	.2	.3	.4	.5	.6	.7	.8	.9
—	0	1	1	2	3	3	3	3	4

In ordinary cases it will be sufficient to apply to the observed zenith distance, the Mean Refraction standing against it in the adjoining column. Where greater accuracy is required, the corresponding log. r must be taken. In the Table of Corrections for the Barometer and Thermometers, the proportional parts of log. t, for tenths of a degree of Fahrenheit, will be found in the column adjoining that of log. t, standing against the corresponding units of the argument. In the same manner, the proportional parts of log. β for hundredths of an inch, will be found standing against the corresponding tenths. These must be added or subtracted according to the sign at the top of the column. The proportional parts of log. τ, for tenths of a degree, will be found at the bottom. The sum of logs. r, t, β, and τ, will be the log. of the refraction, which must be added to the observed zenith distance, or subtracted from the observed altitude. For example see p. 301.

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EQUATIONS TO EQUAL ALTITUDES.

Log. of A.

m.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.
0	7.7297	7.7359	7.7447	7.7562	7.7703	7.7873	7.8072	7.8302	7.8567	7.8868	7.9208
2	.7298	.7362	.7451	.7566	.7708	.7879	.8079	.8311	.8576	.8878	.9220
4	.7300	.7364	.7454	.7570	.7713	.7885	.8086	.8319	.8586	.8889	.9232
6	.7302	.7367	.7458	.7575	.7719	.7891	.8094	.8328	.8595	.8900	.9245
8	.7304	.7369	.7461	.7579	.7724	.7898	.8101	.8336	.8605	.8911	.9257
10	.7305	.7372	.7464	.7583	.7729	.7904	.8108	.8344	.8614	.8922	.9269
12	.7307	.7374	.7468	.7588	.7735	.7910	.8116	.8353	.8624	.8932	.9281
14	.7309	.7377	.7472	.7592	.7740	.7916	.8123	.8361	.8634	.8943	.9294
16	.7311	.7380	.7475	.7597	.7745	.7923	.8130	.8370	.8643	.8954	.9306
18	.7313	.7383	.7479	.7601	.7751	.7929	.8138	.8378	.8653	.8965	.9319
20	.7315	.7386	.7482	.7606	.7756	.7936	.8145	.8387	.8663	.8977	.9331
22	.7317	.7388	.7486	.7610	.7762	.7942	.8153	.8396	.8673	.8988	.9344
24	.7319	.7391	.7490	.7615	.7767	.7949	.8160	.8404	.8683	.8999	.9357
26	.7321	.7394	.7494	.7620	.7773	.7955	.8168	.8413	.8693	.9010	.9369
28	.7323	.7397	.7497	.7624	.7779	.7962	.8176	.8422	.8703	.9021	.9382
30	.7325	.7400	.7501	.7629	.7784	.7969	.8183	.8430	.8713	.9033	.9395
32	.7327	.7403	.7505	.7634	.7790	.7975	.8191	.8439	.8723	.9044	.9408
34	.7329	.7406	.7509	.7638	.7796	.7982	.8199	.8448	.8733	.9055	.9421
36	.7331	.7409	.7513	.7643	.7801	.7989	.8206	.8457	.8743	.9067	.9433
38	.7333	.7412	.7517	.7648	.7807	.7995	.8214	.8466	.8753	.9078	.9446
40	.7336	.7415	.7521	.7653	.7813	.8002	.8222	.8475	.8763	.9090	.9460
42	.7338	.7418	.7525	.7658	.7819	.8009	.8230	.8484	.8773	.9102	.9473
44	.7340	.7421	.7529	.7663	.7825	.8016	.8238	.8493	.8784	.9113	.9486
46	.7342	.7424	.7533	.7668	.7831	.8023	.8246	.8502	.8794	.9125	.9499
48	.7345	.7428	.7537	.7673	.7836	.8030	.8254	.8511	.8804	.9137	.9513
50	.7347	.7431	.7541	.7678	.7842	.8037	.8262	.8520	.8815	.9148	.9526
52	.7349	.7434	.7545	.7683	.7848	.8044	.8270	.8530	.8825	.9160	.9539
54	.7352	.7437	.7549	.7688	.7854	.8051	.8278	.8539	.8836	.9172	.9552
56	.7354	.7441	.7553	.7693	.7860	.8058	.8286	.8548	.8846	.9184	.9566
58	7.7357	7.7444	7.7557	7.7698	7.7867	7.8065	7.8294	7.8558	7.8857	7.9196	7.9580

m.	13 h.	14 h.	15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h
0	7.9593	8.0028	8.0521	8.1082	8.1726	8.2474	8.3359	8.4437	8.5810	8.7711	9.0877
2	.9607	.0044	.0539	.1102	.1749	.2501	.3392	.4477	.5863	.7789	.1029
4	.9620	.0059	.0556	.1122	.1773	.2529	.3424	.4518	.5917	.7868	.1187
6	.9634	.0075	.0574	.1143	.1796	.2556	.3457	.4559	.5971	.7948	.1351
8	.9648	.0090	.0592	.1163	.1819	.2583	.3490	.4600	.6025	.8030	.1520
10	.9662	.0106	.0610	.1183	.1843	.2611	.3524	.4641	.6081	.8113	.1696
12	.9676	.0122	.0628	.1204	.1867	.2639	.3557	.4683	.6136	.8198	.1879
14	.9690	.0138	.0646	.1224	.1890	.2667	.3591	.4726	.6193	.8284	.2069
16	.9704	.0154	.0664	.1245	.1914	.2695	.3625	.4768	.6250	.8372	.2268
18	.9718	.0170	.0682	.1266	.1938	.2723	.3659	.4811	.6308	.8461	.2476
20	.9732	.0186	.0700	.1287	.1963	.2752	.3694	.4854	.6366	.8553	.2693
22	.9746	.0202	.0718	.1308	.1987	.2781	.3728	.4898	.6426	.8645	.2922
24	.9761	.0218	.0737	.1329	.2011	.2809	.3763	.4942	.6486	.8740	.3162
26	.9775	.0234	.0755	.1350	.2036	.2838	.3798	.4987	.6546	.8837	.3416
28	.9789	.0250	.0774	.1371	.2061	.2868	.3834	.5032	.6608	.8935	.3685
30	.9804	.0267	.0792	.1393	.2086	.2897	.3869	.5077	.6670	.9036	.3971
32	.9818	.0283	.0811	.1414	.2111	.2926	.3905	.5123	.6733	.9139	.4276
34	.9833	.0300	.0830	.1436	.2138	.2956	.3941	.5169	.6796	.9244	.4604
36	.9848	.0316	.0849	.1458	.2161	.2986	.3978	.5215	.6861	.9351	.4957
38	.9862	.0333	.0868	.1479	.2186	.3016	.4015	.5262	.6927	.9461	.5341
40	.9877	.0350	.0887	.1501	.2212	.3046	.4052	.5310	.6993	.9574	.5761
42	.9892	.0367	.0906	.1523	.2237	.3077	.4089	.5357	.7060	.9689	.6224
44	.9907	.0384	.0925	.1545	.2263	.3107	.4126	.5406	.7128	.9807	.6742
46	.9922	.0400	.0945	.1568	.2289	.3138	.4164	.5455	.7197	8.9928	.7328
48	.9937	.0417	.0964	.1590	.2315	.3169	.4202	.5504	.7268	9.0052	.8003
50	.9952	.0435	.0983	.1612	.2341	.3200	.4241	.5554	.7339	.9180	.8809
52	.9967	.0452	.1003	.1635	.2367	.3232	.4279	.5604	.7411	.0311	9.9776
54	.9982	.0469	.1023	.1658	.2394	.3263	.4318	.5655	.7484	.0446	0.1031
56	7.9998	.0486	.1042	.1680	.2420	.3295	.4357	.5706	.7558	.0585	0.2798
58	8.0013	8.0504	8.1062	8.1703	8.2447	8.3327	8.4397	8.5758	8.7634	9.0729	0.5814

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EQUATIONS TO EQUAL ALTITUDES.

Log. of B.

B negative.

m.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.
0	7.7146	7.7015	7.6823	7.6556	7.6198	7.5717	7.5062	7.4131	7.2697	7.0025	0.0000
2	.7143	.7010	.6815	.6546	.6184	.5699	.5036	.4103	.2635	6.9889	5.5549
4	.7139	.7005	.6807	.6536	.6170	.5680	.5010	.4055	.2572	.9748	5.2041
6	.7136	.6999	.6800	.6525	.6156	.5661	.4983	.4016	.2507	.9602	6.0414
8	.7132	.6993	.6792	.6514	.6142	.5641	.4957	.3977	.2442	.9449	.1675
10	.7128	.6988	.6784	.6504	.6127	.5622	.4930	.3937	.2374	.9290	.2657
12	.7125	.6982	.6776	.6493	.6113	.5602	.4902	.3896	.2306	.9125	.3461
14	.7121	.6976	.6768	.6482	.6098	.5583	.4874	.3855	.2236	.8953	.4142
16	.7117	.6970	.6759	.6471	.6083	.5562	.4846	.3813	.2164	.8770	.4734
18	.7113	.6964	.6751	.6460	.6068	.5542	.4818	.3771	.2091	.8580	.5258
20	.7109	.6958	.6743	.6448	.6053	.5522	.4789	.3728	.2016	.8379	.5728
22	.7105	.6952	.6734	.6437	.6038	.5501	.4760	.3684	.1940	.8168	.6154
24	.7101	.6945	.6726	.6425	.6023	.5480	.4731	.3639	.1861	.7945	.6545
26	.7097	.6940	.6717	.6414	.6007	.5459	.4701	.3594	.1781	.7709	.6905
28	.7092	.6934	.6708	.6402	.5991	.5437	.4671	.3548	.1699	.7457	.7239
30	.7088	.6927	.6700	.6390	.5975	.5416	.4640	.3501	.1615	.7189	.7551
32	.7083	.6921	.6691	.6378	.5959	.5394	.4609	.3454	.1529	.6901	.7843
34	.7079	.6914	.6682	.6366	.5943	.5372	.4578	.3406	.1440	.6591	.8119
36	.7075	.6908	.6673	.6354	.5927	.5350	.4546	.3357	.1349	.6255	.8380
38	.7070	.6901	.6663	.6342	.5910	.5327	.4514	.3307	.1255	.5889	.8627
40	.7065	.6894	.6654	.6329	.5894	.5304	.4482	.3256	.1160	.5487	.8863
42	.7061	.6888	.6645	.6317	.5877	.5281	.4449	.3205	.1061	.5041	.9087
44	.7056	.6881	.6635	.6304	.5860	.5258	.4415	.3152	.0960	.4541	.9302
46	.7051	.6874	.6626	.6291	.5843	.5234	.4381	.3099	.0855	.3973	.9507
48	.7046	.6867	.6616	.6278	.5825	.5211	.4347	.3045	.0748	.3316	.9705
50	.7041	.6859	.6606	.6265	.5808	.5186	.4312	.2989	.0637	.2536	6.9895
52	.7036	.6852	.6597	.6252	.5790	.5162	.4277	.2933	.0522	.1579	7.0078
54	.7031	.6845	.6587	.6239	.5772	.5137	.4241	.2876	.0404	6.0341	.0254
56	.7026	.6838	.6577	.6225	.5754	.5112	.4205	.2817	.0282	5.8593	.0425
58	7.7021	7.6830	7.6567	7.6212	7.5736	7.5087	7.4168	7.2758	7.0156	5.5594	7.0590

B negative.

m.	13 h.	14 h.	15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.
0	7.0550	7.4158	7.6350	7.8072	7.9571	8.0969	8.2354	8.3842	8.5466	8.7560	9.0839
2	.0905	.4244	.6413	.8125	.9618	.1015	.2401	.3863	.5527	.7643	.0995
4	.1025	.4328	.6475	.8177	.9666	.1060	.2448	.3915	.5588	.7727	.1115
6	.1203	.4412	.6537	.8229	.9713	.1107	.2495	.3966	.5650	.7813	.1321
8	.1345	.4494	.6599	.8281	.9761	.1153	.2542	.4018	.5712	.7899	.1492
10	1484	.4575	.6660	.8333	.9808	.1199	.2589	.4070	.5775	.7987	.1670
12	.1613	.4655	.6721	.8385	.9855	.1245	.2637	.4122	.5838	.8076	.1855
14	.1751	.4735	.6781	.8436	.9902	.1291	.2684	.4175	.5902	.8167	.2047
16	.1880	.4813	.6841	.8487	.9949	.1336	.2732	.4227	.5966	.8259	.2248
18	.2006	.4890	.6900	.8538	7.9996	.1382	.2779	.4280	6031	.8353	.2456
20	.2129	.4967	.6959	.8589	8.0042	.1428	.2827	.4334	.6096	.8448	.2677
22	.2249	.5043	.7018	.8640	.0090	.1474	.2875	.4387	.6162	.8545	.2907
24	.2367	.5118	.7077	.8690	.0137	.1520	.2923	.4441	.6229	.8644	.3149
26	.2482	.5192	.7135	.8740	.0184	.1566	.2971	.4495	.6296	.8745	.3404
28	.2595	.5265	.7192	.8790	.0230	.1612	.3019	.4549	.6364	.8847	.3674
30	.2706	.5338	.7249	.8840	.0277	.1658	.3068	.4604	.6433	.8952	.3962
32	.2815	.5410	.7306	.8890	.0323	.1704	.3116	.4659	.6502	.9058	.4268
34	.2922	.5481	.7363	.8939	.0370	.1750	.3165	.4714	.6572	.9167	.4597
36	.3026	.5551	.7419	.8989	.0416	.1797	.3214	.4770	.6643	.9278	.4952
38	.3129	.5621	.7475	.9038	.0462	.1842	.3263	.4826	.6715	.9391	.5336
40	.3231	.5690	.7531	.9087	.0508	.1889	.3312	.4882	.6788	.9507	.5757
42	.3330	.5759	.7586	.9136	.0555	.1935	.3361	.4939	.6860	.9626	.6221
44	.3428	.5827	.7641	.9185	.0606	.1981	.3410	.4996	.6934	.9747	.6739
46	.3524	.5894	.7696	.9234	.0647	.2028	.3460	.5053	.7009	.9871	.7326
48	.3619	.5961	.7751	.9282	.0693	.2074	.3510	.5111	.7085	8.9999	.8001
50	.3712	.6027	.7805	.9330	.0739	.2121	.3560	.5169	.7162	9.0129	.8800
52	.3804	.6092	.7859	.9379	.0785	.2167	.3610	.5228	.7239	.0263	9.9775
54	.3894	.6158	.7912	.9427	.0831	.2214	.3660	.5287	.7318	.0401	0 1031
56	.3984	.6222	.7966	.9475	.0877	.2261	.3711	.5346	.7398	.0543	0.2798
58	7.4071	7.6286	7.8019	7.9523	8.0923	8.2307	8.3761	8.5406	8.7478	9.0689	0.5814

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Reduction to the Meridian. Part I.

S	0m	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m
	″	″	″	″	″	″	″	″	″	″	″
0	0 00	1.96	7.85	17.67	31.41	49.09	70.68	96.20	125.65	159.02	196.32
1	0.00	2 03	7.99	17.87	31.68	49.41	71.07	96.66	126.17	159.61	196.97
2	0 00	2.10	8.12	18.09	31.94	49 74	71.47	97.12	126.70	160.20	197.63
3	0.00	2.16	8.25	18 27	32 21	50.07	71.86	97.58	127.23	160 79	198.29
4	0.01	2.23	8.39	18.47	32.47	50.40	72.26	98.04	127.75	161.39	198 94
5	0.01	2.30	8.52	18.67	32.74	50.74	72.66	98 51	128 28	161.98	199.60
6	0 02	2 38	8.66	18.87	33.01	51.07	73.06	98.97	128.81	162.58	200.25
7	0 03	2.45	8.80	19.07	33.27	51.40	73.46	99 44	129.34	163.17	200.93
8	0.03	2.52	8.94	19.28	33.54	51.74	73.86	99.90	129.87	163.77	201.59
9	0.04	2 60	9.08	19.48	33.82	52.07	74.26	100 37	130.41	164 37	202.25
10	0 05	2.67	9.22	19.69	34.09	52.41	74.66	100.85	130.94	164.97	202 92
11	0.07	2.75	9.36	19.90	34.36	52 75	75.07	101.31	131.48	165 57	203 58
12	0.08	2.83	9.50	20.11	34.64	53.09	75.47	101.78	132.01	166.17	204 25
13	0.09	2.91	9.65	20.32	34.91	53.43	75 88	102.25	132.55	166.77	204.92
14	0.11	2 99	9.79	20.53	35.19	53.77	76.29	102.72	133.09	167 37	205.59
15	0.12	3.07	9.94	20.74	35 46	54.12	76.70	103 20	133 63	167.98	206.26
16	0.14	3,15	10.09	20 95	35 74	54.46	77.10	103.67	134 17	168.58	206.93
17	0.16	3.23	10.24	21.17	36.02	54.81	77.51	104.15	134.71	169.19	207.60
18	0.18	3.32	10.39	21.38	36.30	55 15	77.92	104 63	135.25	169.80	208.27
19	0.20	3.40	10.54	21.60	36 59	55.50	78.34	105.10	135.79	170.41	208.95
20	0 22	3.49	10 69	21.82	36.87	55.85	78.75	105.58	136 34	171.02	209.62
21	0.24	3.58	10.84	22.03	37.15	56 20	79.17	106.06	136.88	171.63	210.30
22	0 26	3.67	11.00	22.25	37.44	56.55	79.58	106.55	137.43	172.24	210.98
23	0.29	3.76	11.15	22.48	37.72	56.90	80.00	107.03	137 98	172.86	211.66
24	0.31	3.85	11.31	22.70	38.01	57.25	80.42	107.51	138.53	173 47	212.34
25	0.34	3.94	11.47	22.92	38.30	57.61	80.84	108.00	139.08	174 09	213.02
26	0.37	4.03	11.63	23.14	38.59	57.96	81.26	108 48	139.63	174.70	213.70
27	0.40	4.13	11.79	23.37	38.88	58.32	81.68	108.97	140.18	175.32	214.38
28	0.43	4.22	11.95	23.60	39.17	58 68	82.10	109.46	140.74	175.94	215 07
29	0.46	4.32	12.11	23.82	39.47	59.03	82.53	109 95	141.29	176.56	215.75
30	0.49	4.42	12 27	24.05	39.76	59.39	82.95	110.44	141.85	177.18	216.44
31	0.52	4.52	12.44	24.28	40.05	59.76	83 38	110.93	142.40	177.80	217.12
32	0.56	4.62	12 60	24.51	40.35	60 12	83.81	111.42	142.96	178.42	217.81
33	0.59	4.72	12.77	24.74	40.65	60 48	84 23	111.91	143.52	179.05	218.50
34	0 63	4.82	12.94	24.98	40.95	60.84	84.66	112.41	144.08	179.68	219.19
35	0.67	4.92	13.10	25.21	41.25	61.21	85.09	112.90	144.64	180.30	219 89
36	0,71	5.03	13 27	25.45	41.55	61.57	85.52	113.40	145 20	180.93	220.58
37	0.75	5.13	13.44	25.68	41.85	61.94	85.96	113.90	145.77	181.56	221.27
38	0.79	5.24	13.62	25.92	42.15	62.31	86.39	114.40	146.34	182.19	221.97
39	0.83	5.35	13.79	26.16	42.45	62.68	86 82	114.90	146.90	182.82	222.66
40	0.87	5.45	13.96	26.40	42.76	63.05	87.26	115.40	147.46	183.45	223.36
41	0.92	5.56	14.14	26.64	43.06	63.42	87.70	115.90	148.03	184.09	224.06
42	0.96	5.67	14.31	26.88	43.37	63.79	88.13	116.40	148.60	184.72	224.76
43	1.01	5.79	14.49	27.12	43.68	64.16	88.57	116.91	149.17	185.35	225.46
44	1.06	5.90	14.67	27.37	43.99	64.54	89.01	117.41	149.74	185.99	226.16
45	1.10	6.01	14.85	27.61	44.30	64.91	89.46	117.92	150.31	186.63	226.86
46	1.15	6.13	15.03	27.86	44.61	65.29	89.90	118.43	150.88	187.27	227.57
47	1.20	6.24	15.21	28.10	44.92	65.67	90.34	118.94	151.46	187.91	228.27
48	1.26	6.36	15.39	28.35	45.24	66.05	90.79	119.45	152.03	188.55	228.98
49	1.31	6.48	15.58	28.60	45.55	66.43	91.23	119.96	152.61	189.19	329.69
50	1.36	6.60	15.76	28.85	45.87	66.81	91.68	120.47	153.19	189.83	230.40
51	1.42	6.72	15.95	29.10	46.18	67.19	92 13	120.98	153.77	190.47	231.11
52	1.48	6.84	16.14	29.36	46.50	67.58	92.57	121.50	154.35	191.12	231.81
53	1.53	6.96	16.32	29.61	46.82	67.96	93.02	122.01	154.93	191.76	232.53
54	1.59	7.09	16.51	29.86	47.14	68.35	93.47	122.53	155.51	192.41	233.24
55	1.65	7.21	16.70	30.12	47.46	68.73	93.93	123.05	156.09	193.06	233.95
56	1.71	7.34	16.89	30.38	47.79	69.12	94.38	123.57	156.68	193.71	234.67
57	1.77	7.47	17.08	30.64	48.11	69.51	94.83	124.09	157.26	194.36	235.38
58	1.83	7.59	17.28	30.89	48.43	69.90	95.29	124.61	157.85	195.02	236.10
59	1.90	7.72	17.48	31.15	48.76	70.29	95.75	125.13	158.43	195.67	236.82
.2	0.01	0.02	0.03	0.05	0.06	0.07	0.09	0.10	0.11	0.12	0.14
.4	0.01	0.04	0.06	0.09	0.12	0.14	0.17	0.20	0.22	0.25	0.28
.6	0.02	0.06	0.10	0.14	0.18	0.21	0.26	0.30	0.34	0.37	0.41
.8	0 02	0.08	0.13	0.18	0.24	0.28	0.34	0.40	0.45	0.50	0.55

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REDUCTION TO THE MERIDIAN.

S	Part I. 11m	12m	13m	14m	15m	16m	Part II.	+	For Rate. r.	Log rf.
	"	"	"	"	"	"	m. s.	"	s.	
0	237.54	282.68	331.75	384 74	441.63	502.45	1 0	0.00	+33	9.9996683
1	238.26	283.46	332.61	385.66	442.62	503.50	2 0	0.00	+32	.9996784
2	238.98	284.25	333.46	386.58	443.61	504.55	3 0	0.00	+31	.9996884
3	239.70	285.04	334.32	387.50	444.59	505.60	4 0	0.00	+30	.9996985
4	240.42	285.83	335.17	388.42	445.58	506.66	5 0	0.01	+29	.9997085
5	241.15	286.62	336.03	389.34	446.56	507.71	6 0	0.01	+28	.9997186
6	241.87	287.41	336.89	390.26	447.55	508.76	6 30	0.02	+27	.9997286
7	242.60	288.20	337.74	391.18	448.54	509.81	7 0	0.02	+26	.9997387
8	243.33	288.99	338.60	392.10	449.52	510.86	7 30	0.03	+25	.9997487
9	244.06	289.79	339.45	393.02	450.51	511.92	8 0	0.04	+24	.9997588
10	244.79	290.58	340.31	393.94	451.49	512.97	10	0.04	+23	.9997688
11	245.52	291.38	341.17	394.87	452.49	514.03	20	0.05	+22	.9997789
12	246.26	292.18	342.04	395.80	453.49	515 09	30	0.05	+21	.9997889
13	246.99	292 98	342.91	396.73	454.49	516.16	40	0.05	+20	.9997990
14	247.72	293.78	343.77	397.66	455.48	517.22	50	0.06	+19	.9998090
15	248.46	294.58	344.64	398 59	456.48	518.28	9 0	0.06	+18	.9998191
16	249.19	295.38	345.51	399.52	457.48	519.34	10	0.07	+17	.9998291
17	249.93	296.18	346.38	400.45	458.48	520.41	20	0.07	+16	.9998392
18	250.67	296.99	347.24	401.39	459.48	521.47	30	0.08	+15	.9998492
19	251.41	297.79	348.11	402.32	460.48	522.53	40	0.08	+14	.9998593
20	252.15	298.60	348.98	403.25	461.48	523.60	50	0.09	+13	.9998693
21	252.89	299.40	349.85	404.19	462.48	524.67	10 0	0.09	+12	.9998794
22	253.63	300.21	350.73	405.13	463.48	525.74	10	0.10	+11	.9998894
23	254.38	301 02	351.61	406.07	464.49	526.81	20	0.11	+10	.9998995
24	255.12	301.83	352.49	407.02	465.50	527.89	30	0.11	+ 9	.9999095
25	255.87	302.65	353.36	407.96	466.51	528.96	40	0.12	+ 8	.9999196
26	256.62	303.46	354.24	408.90	467.52	530.04	50	0.13	+ 7	.9999296
27	257.37	304.27	355.12	409.84	468.53	531.11	11 0	0 14	+ 6	.9999397
28	258.12	305.09	356.00	410.79	469.54	532.18	10	0.15	+ 5	.9999497
29	258.87	305 90	356.87	411.73	470.55	533.26	20	0.16	+ 4	.9999598
30	259.62	306.72	357.75	412 67	471.56	534.34	30	0.16	+ 3	.9999698
31	260.37	307.54	358.64	413.62	472.57	535.42	40	0.17	+ 2	.9999799
32	261.12	308.36	359.53	414 58	473.59	536.50	50	0.18	+ 1	9.9999899
33	261.88	309.18	360.42	415.53	474.61	537.58	12 0	0.19	0	0.0000000
34	262.64	310.00	361.30	416.49	475.63	538.67	10	0.20	— 1	.0000101
35	263.39	310.82	362.19	417.44	476.65	539.75	20	0.22	— 2	.0000201
36	264.15	311.65	363 08	418 40	477.66	540.84	30	0.23	— 3	.0000302
37	264.91	312.47	363.97	419.35	478.68	541.92	40	0 24	— 4	.0000402
38	265.67	313.30	364.86	420.31	479.70	543.01	50	0.25	— 5	.0000503
39	266.43	314.12	365.75	421.26	480.72	544.09	13 0	0.27	— 6	.0000603
40	267.20	314.95	366.64	422.22	481.74	545.18	10	0.28	— 7	.0000704
41	267.96	315.78	367.54	423.18	482.77	546.27	20	0.30	— 8	.0000804
42	268.72	316.61	368.43	424.14	483.80	547.36	30	0.31	— 9	.0000905
43	269.49	317.44	369.33	425.11	484 83	548.45	40	0.33	—10	.0001005
44	270.26	318.27	370.23	426.07	485.86	549.55	50	0.34	—11	.0001106
45	271 03	319.11	371.13	427.04	486.89	550.64	14 0	0.36	—12	.0001206
46	271.79	319.94	372.03	428.00	487.92	551.74	10	0.38	—13	.0001307
47	272.57	320 78	372.93	428.97	488.95	552.83	20	0.39	—14	.0001407
48	273.34	321.62	373.83	429.94	489.98	553.93	30	0.41	—15	.0001508
49	274.11	322.45	374.73	430.90	491.01	555.02	40	0.43	—16	.0001608
50	274.88	323.29	375.64	431.87	492.04	555.12	50	0.45	—17	.0001709
51	275.66	324.13	376.54	432.85	493 08	558.22	15 0	0.47	—18	.0001809
52	276.43	324.97	377.45	433.82	494 12	559 33	10	0.49	—19	.0001910
53	277.21	325.82	378 36	434.80	495.16	560 44	20	0.52	—20	.0002010
54	277.99	326.66	379.27	435.78	496.20	561.54	30	0.54	—21	.0002111
55	278.77	327.50	380.18	436 75	497.25	562.65	40	0.56	—22	.0002211
56	279.55	328.35	381.09	437 73	498.29	563.76	50	0.59	—23	.0002312
57	280.33	329.20	382.00	438.70	499.33	564.87	16 0	0.61	—24	.0002412
58	281.11	330.04	382.91	439.68	500.37	565.97	10	0.64	—25	.0002513
59	281.89	330.89	383.82	440 66	501 41	567.08	20	0.67	—26	.0002613
.2	0.15	0.16	0.17	0.19	0.20	0.22	30	0.69	—27	.0002714
.4	0.30	0.33	0.34	0.38	0.40	0.43	40	0.72	—28	.0002814
.6	0.45	0.49	0.51	0.57	0.61	0.65	50	0.75	—29	.0002915
.8	0.60	0.66	0.68	0.75	0.81	0.86	17 0	0.78	—30	.0003015
									—31	.0003116
									—32	.0003216
									—33	0.0003317

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Argument = $\tau + \tau'$ (Fahrenheit or Centigrade.)

$\tau+\tau'$ F.	$\tau+\tau'$ C.	Log. V.	Log. W.	$\tau+\tau'$ F.	$\tau+\tau'$ C.	Log. V.	Log. W.	$\tau+\tau'$ F.	$\tau+\tau'$ C.	Log. V.	Log. W.
°	°			°	°			°	°		
+10	— 30.0	3.94891	9.2028	+ 70	+ 3 3	3.97682	9.6824	130	36.7	4.00306	0.1278
11	— 2 .4	.94939	.2110	71	3.9	.97727	.6902	131	37.2	.00348	.1349
12	— 28.9	.94987	.2192	72	4.4	.97772	.6979	132	37.8	.00391	.1421
13	— 28.3	.95034	.2275	73	5.0	.97817	.7056	133	38.3	.00433	.1492
14	— 27.8	.95082	.2357	74	5.6	.97862	.7133	134	38.9	.00475	.1563
15	— 27.2	.95130	.2439	75	6.1	.97907	.7209	135	39.4	.00518	.1634
16	— 26.7	.95178	.2521	76	6.7	.97951	.7285	136	40.0	.00560	.1705
17	— 26.1	.95225	.2604	77	7.2	.97996	.7362	137	40.6	.00.02	.1775
18	— 25.6	.95273	.2686	78	7.8	.98041	.7438	138	41.1	.00644	.1846
19	— 25.0	.95321	.2768	79	8.3	.98086	.7515	139	41.7	.00686	.1916
20	— 24.4	.95368	.2850	80	8.9	.98130	.7591	140	42 2	.00728	.1986
21	— 23.9	.95416	.2931	81	9.4	.98175	.7667	141	42.8	.00770	.2057
22	— 23.3	.95463	.3012	82	10.0	.98220	.7744	142	43.3	00812	.2127
23	— 22.8	.95510	.3094	83	10 6	.98265	.7820	143	43.9	.00854	.2197
24	— 22.2	.95558	.3175	84	11.1	.98309	.7895	144	44.4	.00896	.2268
25	— 21.7	.95605	.3257	85	11.7	.98353	.7971	145	45.0	.00938	.2338
26	— 21.1	.95652	.3338	86	12.2	.98397	.7046	146	45.6	.00980	.2407
27	— 20.6	.95700	.3420	87	12.8	.98442	.8122	147	46.1	.01021	.2477
28	— 20.0	.95747	.3501	88	13.3	.98486	.8197	148	46.7	.01063	.2546
29	— 19.4	.95794	.3582	89	13.9	.98530	.8273	149	47.2	.01105	.2616
30	— 18.9	.95841	.3663	90	14.4	.98575	.8348	150	47.8	.01146	.2685
31	— 18.3	.95888	.3744	91	15.0	.98619	.8424	151	48.3	.01188	.2755
32	— 17.8	.95935	.3825	92	15.6	.98663	.9499	152	48 9	.01230	.2824
33	— 17.2	.95981	.3905	93	16.1	.98707	.8574	153	49.4	.01271	.2893
34	— 16.7	.96028	.3986	94	16.7	.98751	.8648	154	50.0	.01313	.2963
35	— 16.1	.96075	.4066	95	17.2	.98795	.8723	155	50.6	.01354	.3032
36	— 15.6	.96122	.4147	96	17.8	.98838	.8797	156	51.1	.01396	.3100
37	— 15.0	.96169	.4227	97	18.3	.98882	.8872	157	51.7	.01437	.3169
38	— 14.4	.96216	.4307	98	18.9	.98926	.8947	158	52.2	.01478	.3238
39	— 13.9	.96262	.4387	99	19.4	.98970	.9021	159	52.8	.01520	.3306
40	— 13.3	.96308	.4467	100	20.0	.99014	.9096	160	53.3	.01561	.3375
41	— 12.8	.96355	.4547	101	20.6	.99058	.9170	161	53.9	.01602	.3444
42	— 12.2	.96401	.4627	102	21.1	.99101	.9244	162	54.4	.01644	.3512
43	— 11.7	.96448	.4707	103	21.7	.99145	.9317	163	55.0	.01685	.3581
44	— 11 1	.96494	.4786	104	22.2	.99188	.9391	164	55.6	.01726	.3649
45	— 10.6	.96541	.4866	105	22.8	.99232	.9465	165	56.1	.01767	.3716
46	— 10.0	.96587	.4946	106	23.3	.99275	.9539	166	56.7	.01808	.3784
47	— 9.4	.96633	.5025	107	23.9	.99319	.9612	167	57.2	.01844	.3852
48	— 8.9	.96679	.5104	108	24.4	.99362	.9686	468	57 8	.01889	.3919
49	— 8.3	.96725	.5183	109	25.0	.99406	.9760	169	58.3	.01930	.3987
50	— 7.8	.96771	.5262	110	25.6	.99449	.9833	170	58 9	.01971	.4055
51	— 7.2	.96817	.5341	111	26.1	.99492	.9906	171	59.4	.02012	.4122
52	— 6 7	.96863	.5429	112	26.7	.99535	9.9977	172	60.0	.02053	.4190
53	— 6.1	.96909	.5499	113	27.2	.99578	0 0052	173	60.6	.02094	.4257
54	— 5.6	.96955	.5578	114	27.8	.99622	.0124	174	61.1	.02134	.4323
55	— 5.0	.97001	.5657	115	28.3	.99665	.0197	175	61 7	.02175	.4390
56	— 4.4	.97047	.5736	116	28.9	.99708	.0270	176	62.2	.02215	.4457
57	— 3.9	.97092	.5814	117	29.4	.99751	.0343	177	62.8	.02256	.4523
58	— 3.3	.97138	.5892	118	30.0	.99794	.0416	178	63.3	.02296	.4590
59	— 2.8	.97183	.5970	119	30.6	.99837	.0488	179	63.9	.02337	.4657
60	— 2.2	.97229	.6048	120	31.1	.99880	.0560	180	64.4	.02377	.4724
61	— 1 7	.97274	.6126	121	31.7	.99922	.0632	181	65.0	.02418	.4790
62	— 1.1	.97320	.6204	122	32.2	3.99965	.0704	182	65.6	.02458	.4856
63	— 0 6	.97365	.6282	123	32.8	4.00008	.0777	183	66.1	.02498	.4922
64	0.0	.97411	.6360	124	33.3	.00051	.0849	184	66.7	.0.538	.4987
65	+ 0.6	.97457	.6438	125	33.9	.00093	.0921	185	67.2	.02578	.5053
66	+ 1.1	.97502	.6516	126	34.4	.00136	.0993	186	67.8	.02619	.5119
67	+ 1.7	.97547	.6593	127	35.0	.00179	.1065	187	68.3	.02659	.5185
68	+ 2.2	.97592	.6670	128	35.6	.00221	.1136	188	68 9	.02 99	.5250
69	+ 2.8	.97637	.6747	129	36.1	.00264	.1207	189	69.4	.02739	.5316
+70	+ 3.3	3 97682	9.6824	+130	+36.7	4.00306	0.1278	190	70.0	4.02779	0.5382

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FOR DETERMINING ALTITUDES WITH THE BAROMETER.

Table II.

Argument $= t$ and t^1

Arg. F.	Arg. C.	Log. tt.	Arg. F.	Arg. C.	Log. tt.
°	°		°	°	
− 10	− 23.3	0.00163	+ 51	+ 10.6	9.99926
9	22.8	.00159	52	11.1	.99922
8	22.2	.00156	53	11.7	.99918
7	21.7	.00152	54	12.2	.99914
6	21.1	.00148	55	12.8	.99911
5	20.6	.00144	56	13.3	.99907
4	20.0	.00140	57	13.9	.99903
3	19.4	.00136	58	14.4	.99899
2	18.9	.00133	59	15.0	.99895
− 1	18.3	.00128	60	15.6	.99891
0	17.8	.00124	61	16.1	.99887
+ 1	17.2	.00121	62	16.7	.99883
2	16.7	.00117	63	17.2	.99879
3	16.1	.00113	64	17.8	.99876
4	15.6	.00109	65	18.3	.99872
5	15.0	.00106	66	18.9	.99868
6	14.4	.00101	67	19.4	.99864
7	13.9	.00097	68	20.0	.99860
8	13.3	.00093	69	20.6	.99856
9	12.8	.00089	70	21.1	.99852
10	12.2	.00086	71	21.7	.99848
11	11.7	.00082	72	22.2	.99844
12	11.1	.00078	73	22.8	.99841
13	10.6	.00072	74	23.3	.99837
14	10.0	.00070	75	23.9	.99833
15	9.4	.00066	76	24.4	.99829
16	8.9	.00062	77	25.0	.99825
17	8.3	.00058	78	25.6	.99821
18	7.8	.00054	79	26.1	.99817
19	7.2	.00051	80	26.7	.99813
20	6.7	.00057	81	27.2	.99809
21	6.1	.00043	82	27.8	.99806
22	5.6	.00039	83	28.3	.99802
23	5.0	.00035	84	28.9	.99798
24	4.4	.00031	85	29.4	.99794
25	3.9	.00027	86	30.0	.99790
26	3.3	.00023	87	30.6	.99786
27	2.8	.00019	88	31.1	.99782
28	2.2	.00016	89	31.7	.99778
29	1.7	.00012	90	32.2	.99774
30	1.1	.00008	91	32.8	.99771
31	− 0.6	.00004	92	33.3	.99767
32	0.0	0.00000	93	33.9	.99763
33	+ 0.6	9.99996	94	34.4	.99759
34	1.1	.99992	95	35.0	.99755
35	1.7	.99988	96	35.6	.99751
36	2.2	.99984	97	36.1	.99747
37	2.8	.99981	98	36.7	.99743
38	3.3	.99977	99	37.2	.99739
39	3.9	.99973	100	37.8	9.99736
40	4.4	.99969			
41	5.0	.99965			
42	5.6	.99961			
43	6.1	.99957			
44	6.7	.99943			
45	7.2	.99949			
46	7.8	.99946			
47	8.3	.99942			
48	8.9	.99928			
49	9.4	.99934			
+ 50	+ 10.0	9.99930			

For tenths of Fah't.

F.	C.	Diff. Log. tt.
°	°	
0.1	0.055	− 0, 4
0.2	0.110	− 0, 8
0.3	0.165	− 1, 2
0.4	0.220	− 1, 6
0.5	0.275	− 1, 9
0.6	0.330	− 2, 3
0.7	0.385	− 2, 7
0.8	0.440	− 3, 1
0.9	0.495	− 3, 5

Table III.

Arg. $= \frac{W(a+a')}{\sqrt{(\beta\beta')}}$

Arg	Log. $\sqrt{\beta}$	Arg.	Log. $\sqrt{\beta}$
5.0	0	7.76	251
5.1	1	7.77	256
5.2	1	7.78	262
5.3	1	7.79	269
5.4	1	7.80	275
5.5	1	7.81	281
5.6	2	7.82	288
5.7	2	7.83	295
5.8	3	7.84	302
5.9	3	7.85	309
6.6	4	7.86	316
6.1	5	7.87	323
6.2	7	7.88	331
6.3	9	7.89	338
6.4	11	7.90	346
6.5	14	7.91	354
6.6	17	7.92	363
6.7	22	7.93	371
6.8	27	7.94	380
6.9	34	7.95	389
7.0	43	7.96	398
7.1	55	7.97	407
7.2	69	7.98	417
7.3	87	7.99	427
7.4	109	8.00	437
7.41	112	8.01	447
7.42	114	8.02	457
7.43	117	8.03	468
7.44	120	8.04	479
7.45	123	8.05	490
7.46	125	8.06	502
7.47	128	8.07	513
7.48	131	8.08	525
7.49	134	8.09	538
7.50	138	8.10	550
7.51	141	8.11	563
7.52	144	8.12	576
7.53	147	8.13	590
7.54	151	8.14	604
7.55	154	8.15	618
7.56	158	8.16	632
7.57	162	8.17	647
7.58	165	8.18	662
7.59	169	8.19	678
7.60	173	8.20	694
7.61	177	8.21	710
7.62	181	8.22	727
7.63	186	8.23	744
7.64	190	8.24	761
7.65	194	8.25	779
7.66	199	8.26	798
7.67	204	8.27	816
7.68	208	8.28	835
7.69	213	8.29	855
7.70	218	8.30	875
7.71	223	8.31	896
7.72	229	8.32	917
7.73	234	8.33	939
7.74	239	8.34	961
7.75	245	8.35	983
7.76	251		

Table IV.

Argum't = Latitude.

φ	Log. G.	φ	Log. G.
°		°	
0	0.80698	60	0.80527
1	.80698	61	.80523
2	.80698	62	.80520
3	.80698	63	.80517
4	.80697	64	.80514
5	.80696	65	.80511
6	.80696	66	.80508
7	.80695	67	.80505
8	.80694	68	.80502
9	.80692	69	.80500
10	.80691	70	.80497
11	.80689	71	.80494
12	.80688	72	.80492
13	.80686	73	.80489
14	.80685	74	.80487
15	.80682	75	0.80485
16	.80680		
17	.80678		
18	.80676		
19	.80673		
20	.80671		
21	.80668		
22	.80665		
23	.80662		
24	.80659		
25	.80657		
26	.80654		
27	.80650		
28	.80647		
29	.80644		
30	.80641		
31	.80637		
32	.80634		
33	.80630		
34	.80626		
35	.80623		
36	.80619		
37	.80615		
38	.80611		
39	.80607		
40	.80604		
41	.80600		
42	.80595		
43	.80592		
44	.80588		
45	.80584		
46	.80580		
47	.80576		
48	.80572		
49	.80568		
50	.80564		
51	.80560		
52	.80556		
53	.80552		
54	.80549		
55	.80545		
56	.80541		
57	.80537		
58	.80534		
59	.80530		
60	0.80527		

Table V.

Arg. = Approximate Height.

Arg.	F.
1000	0.0
1500	0.1
2000	0.2
2500	0.3
3000	0.4
3500	0.6
4000	0.8
4500	1.0
5000	1.2
5500	1.5
6000	1.7
6500	2.0
7000	2.3
7500	2.7
8000	3.1
8500	3.5
9000	3.9
9500	4.3
10000	4.8
10500	5.3
11000	5.8
11500	6.3
12000	6.9
12500	7.5
13000	8.1
13500	8.7
14000	9.4
14500	10.1
15000	10.8
15500	11.5
16000	12.2
16500	13.0
17000	13.8
17500	14.7
18000	15.5
18500	16.4
19000	17.3
19500	18.2
20000	19.1

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Argument = θ (Centigrade.)

θ	Log $f\,\theta$	Diffs.	Log $\psi\,\theta$	Diffs.	θ	Log $f\,\theta$	Diffs.	Log $\psi\,\theta$	Diffs.
°					°				
− 20	9.4155	304	7.1086	298	+ 5	0.1383	273	6.4493	266
− 19	.4459	303	.0788	297	6	.1656	271	.4227	264
− 18	.4762	302	.0491	296	7	.1927	271	.3963	264
− 17	.5064	300	7.0195	295	8	.2198	269	.3699	262
− 16	.5364	299	6.9900	293	9	.2467	268	.3437	261
− 15	.5663	298	.9607	292	10	.2735	266	.3176	260
− 14	.5961	297	.9315	290	11	.3001	265	.2916	258
− 13	.6258	295	.8925	290	12	.3266	264	.2658	257
− 12	.6553	294	.8735	288	13	.3530	263	.2401	256
− 11	.6847	293	.8447	287	14	.3793	262	.2145	255
− 10	.7140	292	.8160	285	15	.4055	260	.1890	253
− 9	.7432	290	.7875	285	16	.4313	259	.1637	252
− 8	.7722	289	.7590	283	17	.4574	258	.1385	251
− 7	.8011	288	.7307	282	18	.4832	257	.1134	249
− 6	.8299	287	.7025	280	19	.5089	255	.0885	249
− 5	.8586	286	.6745	279	20	.5344	254	.0636	247
− 4	.8871	284	.6466	278	21	.5598	253	.0389	246
− 3	.9155	283	.6188	277	22	.5851	251	6.0143	244
− 2	.9438	282	.5911	276	23	.6102	251	5.9899	243
− 1	9.9720	280	.5635	274	24	.6353	249	.9656	242
0	0.0000	279	.5361		25	.6602	247	.9414	241
			.5842	272	26	.6849	247	.9173	239
+ 1	0.0279	278	.5579	271	27	.7096	245	.8934	239
+ 2	.0557	277	.5299	270	28	.7341	244	.8695	237
+ 3	.0834	275	.5029	268	29	.7585	243	.8458	235
+ 4	.1109	274	.4761	268	30	.7828	242	.8223	234
+ 5	0.1383	273	6.4493	266	+ 31	0.8070		5.7989	

This table is for obtaining a correction depending on the state of the atmosphere with respect to moisture. In order to obtain this correction, the observations require the use of instruments for measuring the temperature of the *dew-point*, of which the most complete is the *Psychrometer*, invented by Mr. August.

From the *Astronomische Nachrichten*.

Let. a = the degree of saturation of the air with moisture.
θ_1 = the temperature of the wet bulb of the centigrade thermometer attached to the Psychrometer.
θ = the temperature of the dry bulb.
(b) = the height of the barometer at the station of the Psychrometer, expressed in Paris Lines, and reduced to the temperature of melting ice.

Then when, $\theta_1 = \theta$, we shall have $a = 1$; in all other cases we must determine a from the formula.

$$\log A = \log f\,\theta_1 - f\,\theta$$
$$\log B = \log A + \log \psi\,\theta_1 + \log(\theta - \theta_1) + \log(b)$$
$$a = A - B$$

The value of θ_1 is the argument for taking out $\log f\,\theta_1$ and $\log \psi\,\theta_1$; and of θ for taking out $\log f\,\theta$.

If the Barometer reads on a scale divided into English inches, we must add the constant [1.05153] to the log of the reading in inches for log (b).

If no instrument for measuring the temperature of the *dew-point* is at hand, we may assume $a = \frac{1}{2}$, for a mean state between perfect dryness and perfect saturation with moisture. A better conjecture than this can often be made without measuring the temperature of the dew-point. If it rains throughout the space between the stations, we may take $a = 1$, and in dry countries, remote from the sea, we may take a less than $\frac{1}{2}$.

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TABLE FOR DETERMINING ALTITUDES WITH THE BAROMETER.

Thermometers in the open air.						Attached Thermometer.		Latitude of the Place.	
$t+t'$	Log. A.	$t+t'$	Log. A.	$t+t'$	Log. A.	$\tau-\tau'$	Log. B.	φ	Log. C.
1°	4.74914	61°	4.77919	121	4.80732	0°	0.00000	0	0.00117
2	.74966	62	.77968	122	.80777	1	.00004	5	0.00115
3	.75017	63	.78016	123	.80822	2	.00009	10	0.00110
4	.75069	64	.78065	124	.80867	3	.00013	15	0.00100
5	.75120	65	.78113	125	.80912	4	.00017	20	0.00090
6	.75172	66	.78161	126	.80957	5	.00022	25	0.00075
7	.75223	67	.78209	127	.81002	6	.00026	30	0.00058
8	.75274	68	.78257	128	.81047	7	.00030	35	0.00040
9	.75326	69	.78305	129	.81092	8	.00035	40	0.00020
10	.75377	70	.78352	130	.81137	9	.00039	45	0.00000
11	.75428	71	.78400	131	.81182	10	.00043	50	9.99980
12	.75479	72	.78449	132	.81227	11	.00048	55	9.99960
13	.75531	73	.78497	133	.81272	12	.00052	60	9.99942
14	.75582	74	.78544	134	.81317	13	.00056	65	9.99925
15	.75633	75	.78592	135	.81362	14	.00061	70	9.99910
16	.75684	76	.78640	136	.81407	15	.00065	75	9.99900
17	.75735	77	.78688	137	.81452	16	.00069	80	9.99890
18	.75786	78	.78735	138	.81496	17	.00074	85	9.99885
19	.75837	79	.78783	139	.81541	18	.00078	90	9.99883
20	.75888	80	.78830	140	.81585	19	.00083		
21	.75938	81	.78878	141	.81630	20	.00087		
22	.75989	82	.78925	142	.81675	21	.00091		
23	.76039	83	.78972	143	.81719	22	.00096		
24	.76090	84	.79019	144	.81763	23	.00100		
25	.76140	85	.79066	145	.81807	24	.00104		
26	.76190	86	.79113	146	.81851	25	.00109		
27	.76241	87	.79160	147	.81895	26	.00113		
28	.76291	88	.79207	148	.81939	27	.00117		
29	.76342	89	.79254	149	.81983	28	.00122		
30	.76392	90	.79301	150	.82027	29	.00126		
31	.76442	91	.79348	151	.82071	30	.00130		
32	.76492	92	.79395	152	.82115	31	.00135		
33	.76542	93	.79442	153	.82159	32	.00139		
34	.76592	94	.79488	154	.82203	33	.00143		
35	.76642	95	.79535	155	.82247	34	.00148		
36	.76692	96	.79582	156	.82291	35	.00152		
37	.76742	97	.79629	157	.82335	36	.00156		
38	.76792	98	.79675	158	.82379	37	.00161		
39	.76842	99	.79722	159	.82423	38	.00165		
40	.76891	100	.79768	160	.82466	39	.00169		
41	.76941	101	.79814	161	.82510	40	.00174		
42	.76990	102	.79860	162	.82553	41	.00178		
43	.77039	103	.79907	163	.82596	42	.00182		
44	.77069	104	.79953	164	.82640	43	.00187		
45	.77138	105	.79999	165	.82683	44	.00191		
46	.77187	106	.80045	166	.82727	45	.00195		
47	.77236	107	.80091	167	.82770	46	.00200		
48	.77285	108	.80137	168	.82813	47	.00204		
49	.77334	109	.80183	169	.82857	48	.00208		
50	.77383	110	.80229	170	.82900	49	.00213		
51	.77432	111	.80275	171	.82943	50	.00217		
52	.77481	112	.80321	172	.82986	51	.00221		
53	.77530	113	.80367	173	.83030	52	.00226		
54	.77579	114	.80412	174	.83073	53	.00230		
55	.77628	115	.80458	175	.83116	54	.00234		
56	.77677	116	.80504	176	.83159	55	.00239		
57	.77726	117	.80550	177	.83201	56	.00243		
58	.77774	118	.80595	178	.83244	57	.00247		
59	.77823	119	.80641	179	.83287	58	.00252		
60	4.77871	120	4.80687	180	4.83329	59	0.00256		

t = height of detached thermometer at lower station; t' = height of detached thermometer at upper station.
τ = height of attached thermometer at lower station; τ' = height of attached thermometer at upper station.
β = height of barometer at lower station; β' = height of barometer at upper station.
Make D equal to $\log. \beta' - (\log. \beta' + \log. B)$; then will the logarithm of the difference of altitudes in English feet be = $\log. A + \log. C + \log. D$.

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SEMI-DIURNAL ARCS. *North Declination.*

Lat.	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°
Dec.	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0
1	6 1	6 1	6 1	6 1	6 1	6 1	6 2	6 2	6 2	6 2	6 2	6 2	6 3	6 3	6 3	6 3	6 3	6 4	6 4	6 4	6 5
2	6 1	6 2	6 2	6 2	6 2	6 3	6 3	6 4	6 4	6 4	6 5	6 5	6 5	6 6	6 6	6 7	6 7	6 8	6 8	6 9	6 10
3	6 2	6 3	6 3	6 3	6 4	6 4	6 5	6 5	6 6	6 6	6 7	6 7	6 8	6 9	6 9	6 10	6 11	6 12	6 12	6 13	6 14
4	6 3	6 3	6 4	6 5	6 5	6 6	6 6	6 7	6 8	6 9	6 9	6 10	6 11	6 12	6 13	6 13	6 14	6 15	6 17	6 18	6 19
5	6 4	6 4	6 5	6 6	6 7	6 7	6 8	6 9	6 10	6 11	6 12	6 13	6 14	6 15	6 16	6 17	6 18	6 19	6 21	6 22	6 24
6	6 4	6 5	6 6	6 7	6 8	6 9	6 10	6 11	6 12	6 13	6 14	6 15	6 16	6 18	6 19	6 20	6 22	6 23	6 25	6 27	6 29
7	6 5	6 6	6 7	6 8	6 9	6 10	6 11	6 13	6 14	6 15	6 16	6 18	6 19	6 20	6 22	6 24	6 25	6 27	6 29	6 31	6 34
8	6 6	6 7	6 8	6 9	6 10	6 12	6 13	6 14	6 16	6 17	6 19	6 20	6 22	6 23	6 25	6 27	6 29	6 31	6 33	6 36	6 39
9	6 6	6 8	6 9	6 10	6 12	6 13	6 15	6 16	6 18	6 19	6 21	6 23	6 25	6 26	6 28	6 31	6 33	6 35	6 38	6 41	6 44
10	6 7	6 9	6 10	6 12	6 13	6 15	6 16	6 18	6 20	6 22	6 23	6 25	6 27	6 29	6 32	6 34	6 37	6 39	6 42	6 45	6 49
11	6 8	6 9	6 11	6 13	6 14	6 16	6 18	6 20	6 22	6 24	6 26	6 28	6 30	6 32	6 35	6 38	6 40	6 43	6 46	6 50	6 54
12	6 9	6 10	6 12	6 14	6 16	6 18	6 20	6 22	6 24	6 26	6 28	6 31	6 33	6 36	6 38	6 41	6 44	6 47	6 51	6 55	6 59
13	6 9	6 11	6 13	6 15	6 17	6 19	6 21	6 24	6 26	6 28	6 31	6 33	6 36	6 39	6 42	6 45	6 48	6 52	6 55	6 59	7 4
14	6 10	6 12	6 14	6 16	6 19	6 21	6 23	6 26	6 28	6 30	6 33	6 36	6 39	6 42	6 45	6 48	6 52	6 56	7 0	7 4	7 9
15	6 11	6 13	6 15	6 18	6 20	6 22	6 25	6 27	6 30	6 33	6 36	6 39	6 42	6 45	6 48	6 52	6 56	7 0	7 4	7 9	7 14
16	6 12	6 14	6 16	6 19	6 21	6 24	6 27	6 29	6 32	6 35	6 38	6 41	6 45	6 48	6 52	6 56	7 0	7 4	7 9	7 14	7 20
17	6 12	6 15	6 17	6 20	6 23	6 26	6 28	6 31	6 34	6 37	6 41	6 44	6 48	6 51	6 55	6 59	7 4	7 9	7 14	7 19	7 25
18	6 13	6 16	6 19	6 21	6 24	6 27	6 30	6 33	6 36	6 40	6 43	6 47	6 51	6 55	6 59	7 3	7 8	7 13	7 19	7 25	7 31
19	6 14	6 17	6 20	6 23	6 26	6 29	6 32	6 35	6 39	6 42	6 46	6 50	6 54	6 58	7 2	7 7	7 12	7 18	7 24	7 30	7 37
20	6 15	6 18	6 21	6 24	6 27	6 30	6 34	6 37	6 41	6 45	6 49	6 53	6 57	7 1	7 6	7 11	7 17	7 22	7 29	7 35	7 43
21	6 16	6 19	6 22	6 25	6 29	6 32	6 36	6 39	6 43	6 47	6 51	6 56	7 0	7 5	7 10	7 15	7 21	7 27	7 34	7 41	7 49
22	6 16	6 20	6 23	6 27	6 30	6 34	6 38	6 41	6 45	6 50	6 54	6 58	7 3	7 8	7 14	7 19	7 25	7 32	7 39	7 47	7 55
23	6 17	6 21	6 24	6 28	6 32	6 36	6 39	6 44	6 48	6 52	6 57	7 1	7 7	7 12	7 17	7 23	7 30	7 37	7 44	7 53	8 2
24	6 18	6 22	6 25	6 29	6 33	6 37	6 41	6 46	6 50	6 55	7 0	7 5	7 10	7 16	7 21	7 28	7 35	7 42	7 50	7 59	8 8
25	6 19	6 23	6 27	6 31	6 35	6 39	6 43	6 48	6 53	6 57	7 2	7 8	7 13	7 19	7 25	7 32	7 39	7 47	7 55	8 5	8 15
26	6 20	6 24	6 28	6 32	6 36	6 41	6 45	6 50	6 55	7 0	7 5	7 11	7 17	7 23	7 30	7 37	7 44	7 52	8 1	8 11	8 22
27	6 21	6 25	6 29	6 34	6 38	6 43	6 48	6 52	6 58	7 3	7 8	7 14	7 20	7 27	7 34	7 41	7 49	7 58	8 7	8 18	8 30
28	6 21	6 26	6 30	6 35	6 40	6 45	6 50	6 55	7 0	7 6	7 11	7 18	7 24	7 31	7 38	7 46	7 55	8 4	8 14	8 25	8 37
29	6 22	6 27	6 32	6 37	6 41	6 47	6 52	6 57	7 3	7 8	7 15	7 21	7 28	7 35	7 43	7 51	8 0	8 10	8 20	8 32	8 45
30	6 23	6 28	6 33	6 38	6 43	6 49	6 54	7 0	7 5	7 11	7 18	7 25	7 32	7 39	7 47	7 56	8 5	8 16	8 27	8 40	8 54
31	6 24	6 29	6 34	6 40	6 45	6 51	6 56	7 2	7 8	7 15	7 21	7 28	7 36	7 44	7 52	8 1	8 11	8 22	8 34	8 47	9 3
32	6 25	6 31	6 36	6 41	6 47	6 53	6 58	7 5	7 11	7 18	7 25	7 32	7 40	7 48	7 57	8 6	8 17	8 28	8 41	8 56	9 13
33	6 26	6 32	6 37	6 43	6 49	6 55	7 1	7 7	7 14	7 21	7 28	7 36	7 44	7 53	8 2	8 12	8 23	8 35	8 49	9 5	9 23
34	6 27	6 33	6 39	6 45	6 51	6 57	7 3	7 10	7 17	7 24	7 32	7 40	7 48	7 57	8 7	8 18	8 30	8 43	8 57	9 14	9 34

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SEMI-DIURNAL ARCS. *South Declination.*

Lat.	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	40°	42°	44°	46°	48°	50°
Dec.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0
1	5 59	5 59	5 59	5 59	5 59	5 59	5 58	5 58	5 58	5 58	5 58	5 58	5 57	5 57	5 57	5 57	5 57	5 56	5 56	5 56	5 55
2	5 59	5 58	5 58	5 58	5 58	5 57	5 57	5 56	5 56	5 56	5 55	5 55	5 55	5 54	5 54	5 53	5 53	5 52	5 52	5 51	5 50
3	5 58	5 57	5 57	5 57	5 56	5 56	5 55	5 55	5 54	5 54	5 53	5 53	5 58	5 51	5 51	5 50	5 49	5 48	5 48	5 47	5 46
4	5 57	5 57	5 56	5 55	5 55	5 54	5 54	5 53	5 52	5 51	5 51	5 50	5 49	5 48	5 47	5 47	5 46	5 45	5 43	5 42	5 41
5	5 56	5 56	5 55	5 54	5 53	5 53	5 52	5 51	5 50	5 49	5 48	5 47	5 46	5 45	5 44	5 43	5 42	5 41	5 39	5 38	5 36
6	5 56	5 55	5 54	5 53	5 52	5 51	5 50	5 49	5 48	5 47	5 46	5 45	5 44	5 42	5 41	5 40	5 38	5 37	5 35	5 33	5 31
7	5 55	5 54	5 53	5 52	5 51	5 50	5 49	5 47	5 46	5 45	5 44	5 42	5 41	5 40	5 38	5 36	5 35	5 33	5 31	5 29	5 26
8	5 54	5 53	5 52	5 51	5 50	5 48	5 47	5 46	5 44	5 43	5 41	5 40	5 38	5 37	5 35	5 33	5 31	5 29	5 27	5 24	5 21
9	5 54	5 52	5 51	5 50	5 48	5 47	5 45	5 44	5 42	5 41	5 39	5 37	5 35	5 34	5 32	5 29	5 27	5 25	5 22	5 19	5 16
10	5 53	5 51	5 50	5 48	5 47	5 45	5 44	5 42	5 40	5 38	5 37	5 35	5 33	5 31	5 28	5 26	5 23	5 21	5 18	5 15	5 11
11	5 52	5 51	5 49	5 47	5 46	5 44	5 42	5 40	5 38	5 36	5 34	5 32	5 30	5 28	5 25	5 22	5 20	5 17	5 14	5 10	5 6
12	5 51	5 50	5 48	5 46	5 44	5 42	5 40	5 38	5 36	5 34	5 32	5 29	5 27	5 24	5 22	5 19	5 16	5 13	5 9	5 5	5 1
13	5 51	5 49	5 47	5 45	5 43	5 41	5 39	5 36	5 34	5 32	5 29	5 27	5 24	5 21	5 18	5 15	5 12	5 8	5 5	5 1	4 56
14	5 50	5 48	5 46	5 44	5 41	5 39	5 37	5 34	5 32	5 30	5 27	5 24	5 21	5 18	5 15	5 12	5 8	5 4	5 0	4 56	4 51
15	5 49	5 47	5 45	5 42	5 40	5 38	5 35	5 33	5 30	5 27	5 24	5 21	5 18	5 15	5 12	5 8	5 4	5 0	4 56	4 51	4 46
16	5 48	5 46	5 44	5 41	5 39	5 36	5 33	5 31	5 28	5 25	5 22	5 19	5 15	5 12	5 8	5 4	5 0	4 56	4 51	4 46	4 40
17	5 48	5 45	5 43	5 40	5 37	5 34	5 32	5 28	5 26	5 23	5 19	5 16	5 12	5 9	5 5	5 1	4 56	4 51	4 46	4 41	4 35
18	5 47	5 44	5 41	5 39	5 36	5 33	5 30	5 27	5 24	5 20	5 17	5 13	5 9	5 5	5 1	4 57	4 52	4 47	4 41	4 35	4 29
19	5 46	5 43	5 40	5 37	5 34	5 31	5 28	5 25	5 21	5 18	5 14	5 10	5 6	5 2	4 58	4 53	4 48	4 42	4 36	4 30	4 23
20	5 45	5 42	5 39	5 36	5 33	5 30	5 26	5 23	5 19	5 15	5 11	5 7	5 3	4 59	4 54	4 49	4 43	4 38	4 31	4 25	4 17
21	5 44	5 41	5 38	5 35	5 31	5 28	5 24	5 21	5 17	5 13	5 9	5 4	5 0	4 55	4 50	4 45	4 39	4 33	4 26	4 19	4 11
22	5 44	5 40	5 37	5 33	5 30	5 26	5 22	5 19	5 15	5 10	5 6	5 2	4 57	4 52	4 46	4 41	4 35	4 28	4 21	4 13	4 5
23	5 43	5 39	5 36	5 32	5 28	5 24	5 21	5 16	5 12	5 8	5 3	4 59	4 53	4 48	4 43	4 37	4 30	4 23	4 16	4 7	3 58
24	5 42	5 38	5 35	5 31	5 27	5 23	5 19	5 14	5 10	5 5	5 0	4 55	4 50	4 44	4 39	4 32	4 25	4 18	4 10	4 1	3 52
25	5 41	5 37	5 33	5 29	5 25	5 21	5 17	5 12	5 7	5 3	4 58	4 52	4 47	4 41	4 35	4 28	4 21	4 13	4 5	3 55	3 45
26	5 40	5 36	5 32	5 28	5 24	5 19	5 15	5 10	5 5	5 0	4 55	4 49	4 43	4 37	4 30	4 23	4 16	4 8	3 59	3 49	3 38
27	5 39	5 35	5 31	5 26	5 22	5 17	5 12	5 8	5 2	4 57	4 52	4 46	4 40	4 33	4 26	4 19	4 11	4 2	3 53	3 42	3 30
28	5 39	5 34	5 30	5 25	5 20	5 15	5 10	5 5	5 0	4 54	4 49	4 42	4 36	4 29	4 22	4 14	4 5	3 56	3 46	3 35	3 23
29	5 38	5 33	5 28	5 23	5 19	5 13	5 8	5 3	4 57	4 52	4 45	4 39	4 32	4 25	4 17	4 9	4 0	3 50	3 40	3 28	3 15
30	5 37	5 32	5 27	5 22	5 17	5 11	5 6	5 0	4 55	4 49	4 42	4 35	4 28	4 21	4 13	4 4	3 55	3 44	3 33	3 20	3 6
31	5 36	5 31	5 26	5 20	5 15	5 9	5 4	4 58	4 52	4 45	4 39	4 32	4 24	4 16	4 8	3 59	3 49	3 38	3 26	3 13	2 57
32	5 35	5 29	5 24	5 19	5 13	5 7	5 2	4 55	4 49	4 42	4 35	4 28	4 20	4 12	4 3	3 54	3 43	3 32	3 19	3 4	2 47
33	5 34	5 28	5 23	5 17	5 11	5 5	4 59	4 53	4 46	4 39	4 32	4 24	4 16	4 7	3 58	3 58	3 37	3 25	3 11	2 55	2 37
34	5 33	5 27	5 21	5 15	5 9	5 3	4 57	4 50	4 43	4 36	4 28	4 20	4 12	4 3	3 53	3 53	3 30	3 17	3 3	2 46	2 26

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RIGHT ASCENSION IN ARC INTO MEAN TIME.

R. A. in Arc.	Mean Time.	R. A. in Arc.	Mean Time.	R. A. in Arc.	Mean Time.	R. A. in Arc.	Mean Time.	R. A. in Arc.	Mean Time.
°	h. m. s.	°	h. m. s.	°	h. m. s.	′	m. s.	′	s.
1	0 3 59.345	61	4 3 20.027	121	8 2 40.708	1	0 3.989	1	0.066
2	0 7 58.689	62	4 7 19.371	122	8 6 40.053	2	0 7.978	2	0.133
3	0 11 58.034	63	4 11 18.716	123	8 10 39.398	3	0 11.969	3	0.199
4	0 15 57.379	64	4 15 18.061	124	8 14 38.742	4	0 15.956	4	0.266
5	0 19 56.724	65	4 19 17.405	125	8 18 38.087	5	0 19.945	5	0 332
6	0 23 56.068	66	4 23 16.750	126	8 22 37.432	6	0 23 935	6	0.399
7	0 27 55.413	67	4 27 16.095	127	8 26 36.776	7	0 27.924	7	0.465
8	0 31 54.758	68	4 31 15.639	128	8 30 36.121	8	0 31.913	8	0.532
9	0 35 54.102	69	4 35 14.784	129	8 34 35.466	9	0 35.902	9	0.598
10	0 39 53.447	70	4 39 14.129	130	8 38 34.810	10	0 39.891	10	0.665
11	0 43 52.792	71	4 43 13.474	131	8 42 34.155	11	0 43.880	11	0.731
12	0 47 52.136	72	4 47 12.818	132	8 46 33.500	12	0 47.869	12	0.798
13	0 51 51.481	73	4 51 12.163	133	8 50 32.845	13	0 51 858	13	0.864
14	0 55 50.826	74	4 55 11.508	134	8 54 32.189	14	0 55 847	14	0.931
15	0 59 50.170	75	4 59 10.852	135	8 58 31.534	15	0 59.836	15	0.997
16	1 3 49.515	76	5 3 10.197	136	9 2 30.879	16	1 3.825	16	1.064
17	1 7 48.860	77	5 7 9.542	137	9 6 30.223	17	1 7.814	17	1.130
18	1 11 48.205	78	5 11 8.886	138	9 10 29.568	18	1 11.803	18	1.197
19	1 15 47.549	79	5 15 8.231	139	9 14 28.913	19	1 15 793	19	1.263
20	1 19 46.894	80	5 19 7.576	140	9 18 28.257	20	1 19.782	20	1.330
21	1 23 46.239	81	5 23 6.920	141	9 22 27.602	21	1 23.771	21	1.396
22	1 27 45.583	82	5 27 6.265	142	9 26 26.947	22	1 27.760	22	1.463
23	1 31 44.928	83	5 31 5.610	143	9 30 26.292	23	1 31 749	23	1.529
24	1 35 44.273	84	5 35 4.955	144	9 34 25.636	24	1 35.738	24	1 596
25	1 39 43.617	85	5 39 4.299	145	9 38 24.981	25	1 39.727	25	1.662
26	1 43 42.962	86	5 43 3.644	146	9 42 24.326	26	1 43.716	26	1.729
27	1 47 42.307	87	5 47 2.989	147	9 46 23.670	27	1 47.705	27	1.795
28	1 51 41.652	88	5 51 2.333	148	9 50 23.015	28	1 51.694	28	1.862
29	1 55 40.996	89	5 55 1.678	149	9 54 22.360	29	1 55 683	29	1.928
30	1 59 40.341	90	5 59 1.023	150	9 58 21.704	30	1 59.672	30	1.995
31	2 3 39.686	91	6 3 0.367	151	10 2 21.049	31	2 3.661	31	2.061
32	2 7 39.030	92	6 6 59.712	152	10 6 20.394	32	2 7 650	32	2.128
33	2 11 38.375	93	6 10 59.057	153	10 10 19.738	33	2 11 640	33	2.194
34	2 15 37.720	94	6 14 58.401	154	10 14 19.083	34	2 15.629	34	2.261
35	2 19 37.064	95	6 18 57.746	155	10 18 18.428	35	2 19.618	35	2.327
36	2 23 36 409	96	6 22 57.091	156	10 22 17.773	36	2 23.607	36	2.393
37	2 27 35.754	97	6 26 56.436	157	10 26 17.117	37	2 27.596	37	2.460
38	2 31 35.099	98	6 30 55.780	158	10 30 16.462	38	2 31.585	38	2.526
39	2 35 34.443	99	6 34 55.125	159	10 34 15.807	39	2 35.574	39	2.5 3
40	2 39 33.788	100	6 38 54.470	160	10 38 15.151	40	2 39 563	40	2.659
41	2 43 33.133	101	6 42 53.814	161	10 42 14.496	41	2 43.552	41	2.726
42	2 47 32.477	102	6 46 53.159	162	10 46 13.841	42	2 47.541	42	2.792
43	2 51 31.822	103	6 50 52.504	163	10 50 13.185	43	2 51.530	43	2.859
44	2 55 31.167	104	6 54 51.848	164	10 54 12.530	44	2 55 519	44	2.925
45	2 59 30.511	105	6 58 51.193	165	10 58 11.875	45	2 59.509	45	2.992
46	3 3 29.856	106	7 2 50.538	166	11 2 11.220	46	3 3.498	46	3.058
47	3 7 29.201	107	7 6 49.883	167	11 6 10.564	47	3 7.487	47	3.125
48	3 11 28.545	108	7 10 49.227	168	11 10 9.909	48	3 11.476	48	3.191
49	3 15 27.890	109	7 14 48.572	169	11 14 9.254	49	3 15.465	49	3 258
50	3 19 27.235	110	7 18 47.917	170	11 18 8.598	50	3 19.454	50	3 324
51	3 23 26.580	111	7 22 47.261	171	11 22 7.943	51	3 23.443	51	3.391
52	3 27 25.924	112	7 26 46.606	172	11 26 7.288	52	3 27.432	52	3.457
53	3 31 25.269	113	7 30 45.951	173	11 30 6.632	53	3 31.421	53	3.524
54	3 35 24.614	114	7 34 45.295	174	11 34 5.977	54	3 35.410	54	3.590
55	3 39 23.958	115	7 38 44.640	175	11 38 5.322	55	3 39.399	55	3.657
56	3 43 23.303	116	7 42 43.985	176	11 42 4.666	56	3 43.388	56	3.723
57	3 47 22.648	117	7 46 43.329	177	11 46 4.011	57	3 47.377	57	3.790
58	3 51 21.992	118	7 50 42.674	178	11 50 3.356	58	3 51.367	58	3.856
59	3 55 21.337	119	7 54 42.019	179	11 54 2.701	59	3 55.356	59	3.923
60	3 59 20 682	120	7 58 41.364	180	11 58 2.045	60	3 59.345	60	3.989

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MEAN TIME INTO RIGHT ASCENSION IN ARC.

Mean Time.	R. A. in Arc.	Mean Time.	R. A. in Arc.	Mean Time.	R. A. in Arc.	Mean Time.	R. A. in Arc.	Mean Time.	R. A. in Arc.
h.	° ′ ″	m.	° ′ ″	s.	′ ″	s.	″	s.	″
1	15 2 27.85	1	0 15 2.46	1	0 15.04	0.01	0.15	0.61	9.18
2	30 4 52.69	2	0 30 4.93	2	0 30.08	0.02	0.30	0.62	9.33
3	45 7 23.54	3	0 45 30.39	3	0 45.12	0.03	0.45	0.63	9.48
4	60 9 51.39	4	1 0 9.86	4	1 0.16	0.04	0.60	0.64	9.63
5	75 12 19.24	5	1 15 12.32	5	1 15.21	0.05	0.75	0.65	9.78
6	90 14 47.08	6	1 30 14.79	6	1 30.25	0.06	0.90	0.66	9.93
7	105 17 14.93	7	1 45 17.25	7	1 45.29	0.07	1.05	0.67	10.08
8	120 19 42.78	8	2 0 19.71	8	2 0.33	0.08	1.20	0.68	10.23
9	135 22 10.62	9	2 15 22.18	9	2 15.37	0.09	1.35	0.69	10.48
10	150 24 38.47	10	2 30 24.64	10	2 30.41	0.10	1.50	0.70	10.53
11	165 27 6.32	11	2 45 27.11	11	2 45.45	0.11	1.65	0.71	10.68
12	180 29 34.16	12	3 0 29.57	12	3 0.49	0.12	1.81	0.72	10.83
13	195 32 2.01	13	3 15 32.03	13	3 15.53	0.13	1.96	0.73	10.98
14	210 34 29.86	14	3 30 34.50	14	3 30.58	0.14	2.11	0.74	11.13
15	225 36 57.70	15	3 45 36.96	15	3 45.62	0.15	2.26	0.75	11.28
16	240 39 25.55	16	4 0 39.43	16	4 0.66	0.16	2.41	0.76	11.43
17	255 41 53.40	17	4 15 41.89	17	4 15.70	0.17	2.56	0.77	11.58
18	270 44 21.24	18	4 30 44.35	18	4 30.74	0.18	2.71	0.78	11.74
19	285 46 49.09	19	4 45 46.82	19	4 45.78	0.19	2.86	0.79	11.89
20	300 49 16.94	20	5 0 49.28	20	5 0.82	0.20	3.01	0.80	12.04
21	315 51 44.78	21	5 15 51.75	21	5 15.86	0.21	3.16	0.81	12.19
22	330 54 12.63	22	5 30 54.21	22	5 30.90	0.22	3.31	0.82	12.34
23	345 56 40.48	23	5 45 56.67	23	5 45.94	0.23	3.46	0.83	12.49
24	360 59 8.33	24	6 0 59.14	24	6 1.00	0.24	3.61	0.84	12.64
		25	6 16 1.60	25	6 16.03	0.25	3.76	0.85	12.79
		26	6 31 4.07	26	6 31.07	0.26	3.91	0.86	12.94
		27	6 46 6.53	27	6 46.11	0.27	4.06	0.87	13.09
		28	7 1 9.00	28	7 1.15	0.28	4.21	0.88	13.24
		29	7 16 11.46	29	7 16.19	0.29	4.36	0.89	13.39
		30	7 31 13.92	30	7 31.23	0.30	4.51	0.90	13.54
		31	7 46 16.39	31	7 46.27	0.31	4.66	0.91	13.69
		32	8 1 18.85	32	8 1.31	0.32	4.81	0.92	13.84
		33	8 16 21.31	33	8 16.36	0.33	4.96	0.93	13.99
		34	8 31 23.78	34	8 31.40	0.34	4.12	0.94	14.14
		35	8 46 26.24	35	8 46.44	0.35	5.27	0.95	14.29
		36	9 1 28.71	36	9 1.48	0.36	5.42	0.96	14.44
		37	9 16 31.17	37	9 16.52	0.37	5.57	0.97	14.59
		38	9 31 33.64	38	9 31.56	0.38	5.72	0.98	14.74
		39	9 46 36.10	39	9 46.60	0.39	5.87	0.99	14.89
		40	10 1 38.57	40	10 1.64	0.40	6.02	1.00	15.05
		41	10 16 41.03	41	10 16.68	0.41	6.17	Thousandths of Seconds of Mean Time.	R. A. in Arc.
		42	10 31 43.39	42	10 31.73	0.42	6.32		
		43	10 46 45.96	43	10 46.77	0.43	6.47		
		44	11 1 48.42	44	11 1.81	0.44	6.62		
		45	11 16 50.89	45	11 16.85	0.45	6.77		
		46	11 31 53.35	46	11 31.89	0.46	6.92		
		47	11 46 55.81	47	11 46.93	0.47	7.07		
		48	12 1 58.38	48	12 1.97	0.48	7.22		
		49	12 17 0.74	49	12 17.01	0.49	7.37		
		50	12 32 3.21	50	12 32.05	0.50	7.52	s.	″
		51	12 47 5.57	51	12 47.09	0.51	7.67	.001	0.02
		52	13 2 8.13	52	13 2.14	0.52	7.82	.002	0.03
		53	13 17 10.60	53	13 17.18	0.53	7.97	.003	0.05
		54	13 32 13.06	54	13 32.22	0.54	8.12	.004	0.06
		55	13 47 15.53	55	13 47.26	0.55	8.27	.005	0.08
		56	14 2 17.99	56	14 2.30	0.56	8.43	.006	0.09
		57	14 17 20.45	57	14 17.34	0.57	8.58	.007	0.11
		58	14 32 22.92	58	14 32.38	0.58	8.73	.008	0.12
		59	14 47 25.38	59	14 47.42	0.59	8.88	.009	0.14
		60	15 2 27.85	60	15 2.46	0.60	9.03	.010	0.15

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TABLE OF LOGARITHMS.

′ ″	Nat. Prime.	0	1	2	3	4	5	6	7	8	9	Proportional Parts. 1	2	3	4	5	6	7	8	9
1 40	10	.0000	.0043	.0086	.0128	.0170	.0212	.0253	.0294	.0334	.0374	4	8	12	17	21	25	29	33	37
1 50	11	.0414	.0453	.0492	.0531	.0569	.0607	.0645	.0682	.0719	.0755	4	8	11	15	19	23	26	30	34
2 0	12	.0792	.0828	.0864	.0899	.0934	.0969	.1004	.1038	.1072	.1106	3	7	10	14	17	21	24	28	31
2 10	13	.1139	.1173	.1206	.1239	.1271	.1303	.1335	.1367	.1399	.1430	3	6	10	13	16	19	23	26	29
2 20	14	.1461	.1492	.1523	.1553	.1584	.1614	.1644	.1673	.1703	.1732	3	6	9	12	15	18	21	24	27
2 30	15	.1761	.1790	.1818	.1847	.1875	.1903	.1931	.1959	.1987	.2014	3	6	8	11	14	17	20	22	25
2 40	16	.2041	.2068	.2095	.2122	.2148	.2175	.2201	.2227	.2253	.2279	3	5	8	11	13	16	18	21	24
2 50	17	.2304	.2330	.2355	.2380	.2405	.2430	.2455	.2480	.2504	.2529	2	5	7	10	12	15	17	20	22
3 0	18	.2553	.2577	.2601	.2625	.2648	.2672	.2695	.2718	.2742	.2765	2	5	7	9	12	14	16	19	21
3 10	19	.2788	.2810	.2833	.2856	.2878	.2900	.2923	.2945	.2967	.2989	2	4	7	9	11	13	16	18	20
3 20	20	.3010	.3032	.3054	.3075	.3096	.3118	.3139	.3160	.3181	.3201	2	4	6	8	11	13	15	17	19
3 30	21	.3222	.3243	.3263	.3284	.3304	.3324	.3345	.3365	.3385	.3404	2	4	6	8	10	12	14	16	18
3 40	22	.3424	.3444	.3464	.3483	.3502	.3522	.3541	.3560	.3579	.3598	2	4	6	8	10	12	14	15	17
3 50	23	.3617	.3636	.3655	.3674	.3692	.3711	.3729	.3747	.3766	.3784	2	4	6	7	9	11	13	15	17
4 0	24	.3802	.3820	.3838	.3856	.3874	.3892	.3909	.3927	.3945	.3962	2	4	5	7	9	11	12	14	16
4 10	25	.3979	.3997	.4014	.4031	.4048	.4065	.4082	.4099	.4116	.4133	2	3	5	7	9	10	12	14	15
4 20	26	.4150	.4166	.4183	.4200	.4216	.4232	.4249	.4265	.4281	.4298	2	3	5	7	8	10	11	13	15
4 30	27	.4314	.4330	.4346	.4362	.4378	.4393	.4409	.4425	.4440	.4456	2	3	5	6	8	9	11	13	14
4 40	28	.4472	.4487	.4502	.4518	.4533	.4548	.4564	.4579	.4594	.4609	2	3	5	6	8	9	11	12	14
4 50	29	.4624	.4639	.4654	.4669	.4683	.4698	.4713	.4728	.4742	.4757	1	3	4	6	7	9	10	12	13
5 0	30	.4771	.4786	.4800	.4814	.4829	.4843	.4857	.4871	.4886	.4900	1	3	4	6	7	9	10	11	13
5 10	31	.4914	.4928	.4942	.4955	.4969	.4983	.4997	.5011	.5024	.5038	1	3	4	6	7	8	10	11	12
5 20	32	.5051	.5065	.5079	.5092	.5105	.5119	.5132	.5145	.5159	.5172	1	3	4	5	7	8	9	11	12
5 30	33	.5185	.5198	.5211	.5224	.5237	.5250	.5263	.5276	.5289	.5302	1	3	4	5	6	8	9	10	12
5 40	34	.5315	.5328	.5340	.5353	.5366	.5378	.5391	.5403	.5416	.5428	1	3	4	5	6	8	9	10	11
5 50	35	.5441	.5453	.5465	.5478	.5490	.5502	.5514	.5527	.5539	.5551	1	2	4	5	6	7	9	10	11
6 0	36	.5563	.5575	.5587	.5599	.5611	.5623	.5635	.5647	.5658	.5670	1	2	4	5	6	7	8	10	11
6 10	37	.5682	.5694	.5705	.5717	.5729	.5740	.5752	.5763	.5775	.5786	1	2	3	5	6	7	8	9	10
6 20	38	.5798	.5809	.5821	.5832	.5843	.5855	.5866	.5877	.5888	.5899	1	2	3	5	6	7	8	9	10
6 30	39	.5911	.5922	.5933	.5944	.5955	.5966	.5977	.5988	.5999	.6010	1	2	3	4	5	7	8	9	10
6 40	40	.6021	.6031	.6042	.6053	.6064	.6075	.6085	.6096	.6107	.6117	1	2	3	4	5	6	8	9	10
6 50	41	.6128	.6138	.6149	.6160	.6170	.6180	.6191	.6201	.6212	.6222	1	2	3	4	5	6	7	8	9
7 0	42	.6232	.6243	.6253	.6263	.6274	.6284	.6294	.6304	.6314	.6325	1	2	3	4	5	6	7	8	9
7 10	43	.6335	.6345	.6355	.6365	.6375	.6385	.6395	.6405	.6415	.6425	1	2	3	4	5	6	7	8	9
7 20	44	.6435	.6444	.6454	.6464	.6474	.6484	.6493	.6503	.6513	.6522	1	2	3	4	5	6	7	8	9
7 30	45	.6532	.6542	.6551	.6561	.6571	.6580	.6590	.6599	.6609	.6618	1	2	3	4	5	6	7	8	9
7 40	46	.6628	.6637	.6646	.6656	.6665	.6675	.6684	.6693	.6702	.6712	1	2	3	4	5	6	7	7	8
7 50	47	.6721	.6730	.6739	.6749	.6758	.6767	.6776	.6785	.6794	.6803	1	2	3	4	5	5	6	7	8
8 0	48	.6812	.6821	.6830	.6839	.6848	.6857	.6866	.6875	.6884	.6893	1	2	3	4	4	5	6	7	8
8 10	49	.6902	.6911	.6920	.6928	.6937	.6946	.6955	.6964	.6972	.6981	1	2	3	4	4	5	6	7	8
8 20	50	.6990	.6998	.7007	.7016	.7024	.7033	.7042	.7050	.7059	.7067	1	2	3	3	4	5	6	7	8
8 30	51	.7076	.7084	.7093	.7101	.7110	.7118	.7126	.7135	.7143	.7152	1	2	3	3	4	5	6	7	8
8 40	52	.7160	.7168	.7177	.7185	.7193	.7202	.7210	.7218	.7226	.7235	1	2	2	3	4	5	6	7	7
8 50	53	.7243	.7251	.7259	.7267	.7275	.7284	.7292	.7300	.7308	.7316	1	2	2	3	4	5	6	6	7
9 0	54	.7324	.7332	.7340	.7348	.7356	.7364	.7372	.7380	.7388	.7396	1	2	2	3	4	5	6	6	7

CONSTANTS.

Comp. log. of 12 hours	5.36452	Comp. log. of No. 12	8.92082
" " 24 "	5.06349	" " 24	8.61979
" " 48 "	4.76246	" " 48	8.31876

Log of 1 degree or 1 hour expressed in seconds 3.55630

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TABLE OF LOGARITHMS.

′ ″	Nat. Numb.	0	1	2	3	4	5	6	7	8	9	Proportional Parts. 1	2	3	4	5	6	7	8	9
9 10	55	.7404	.7412	.7419	.7427	.7435	.7443	.7451	.7459	.7466	.7474	1	2	2	3	4	5	5	6	7
9 20	56	.7482	.7490	.7497	.7505	.7513	.7520	.7528	.7536	.7543	.7551	1	2	2	3	4	5	5	6	7
9 30	57	.7559	.7566	.7574	.7582	.7589	.7597	.7604	.7612	.7619	.7627	1	2	2	3	4	5	5	6	7
9 40	58	.7634	.7642	.7649	.7657	.7664	.7672	.7679	.7686	.7694	.7701	1	1	2	3	4	4	5	6	7
9 50	59	.7709	.7716	.7723	.7731	.7738	.7745	.7752	.7760	.7767	.7774	1	1	2	3	4	4	5	6	7
10 0	60	.7782	.7789	.7796	.7803	.7810	.7818	.7825	.7832	.7839	.7846	1	1	2	3	4	4	5	6	6
10 10	61	.7853	.7860	.7868	.7875	.7882	.7889	.7896	.7903	.7910	.7917	1	1	2	3	4	4	5	6	6
10 20	62	.7924	.7931	.7938	.7945	.7952	.7959	.7966	.7973	.7980	.7987	1	1	2	3	3	4	5	6	6
10 30	63	.7993	.8000	.8007	.8014	.8021	.8028	.8035	.8041	.8048	.8055	1	1	2	3	3	4	5	5	6
10 40	64	.8062	.8069	.8075	.8082	.8089	.8096	.8102	.8109	.8116	.8122	1	1	2	3	3	4	5	5	6
10 50	65	.8129	.8136	.8142	.8149	.8156	.8162	.8169	.8176	.8182	.8189	1	1	2	3	3	4	5	5	6
11 0	66	.8195	.8202	.8209	.8215	.8222	.8228	.8235	.8241	.8248	.8254	1	1	2	3	3	4	5	5	6
11 10	67	.8261	.8267	.8274	.8280	.8287	.8293	.8299	.8306	.8312	.8319	1	1	2	3	3	4	5	5	6
11 20	68	.8325	.8331	.8338	.8344	.8351	.8357	.8363	.8370	.8376	.8382	1	1	2	3	3	4	4	5	6
11 30	69	.8388	.8395	.8401	.8407	.8414	.8420	.8426	.8432	.8439	.8445	1	1	2	2	3	4	4	5	6
11 40	70	.8451	.8457	.8463	.8470	.8476	.8482	.8488	.8494	.8500	.8506	1	1	2	2	3	4	4	5	6
11 50	71	.8513	.8519	.8525	.8531	.8537	.8543	.8549	.8555	.8561	.8567	1	1	2	2	3	4	4	5	5
12 0	72	.8573	.8579	.8585	.8591	.8597	.8603	.8609	.8615	.8621	.8627	1	1	2	2	3	4	4	5	5
12 10	73	.8633	.8639	.8645	.8651	.8657	.8663	.8669	.8675	.8681	.8686	1	1	2	2	3	4	4	5	5
12 20	74	.8692	.8698	.8704	.8710	.8716	.8722	.8727	.8733	.8739	.8745	1	1	2	2	3	4	4	5	5
12 30	75	.8751	.8756	.8762	.8768	.8774	.8779	.8785	.8791	.8797	.8802	1	1	2	2	3	3	4	5	5
12 40	76	.8808	.8814	.8820	.8825	.8831	.8837	.8842	.8848	.8854	.8859	1	1	2	2	3	3	4	5	5
12 50	77	.8865	.8871	.8876	.8882	.8887	.8893	.8899	.8904	.8910	.8915	1	1	2	2	3	3	4	4	5
13 0	78	.8921	.8927	.8932	.8938	.8943	.8949	.8954	.8960	.8965	.8971	1	1	2	2	3	3	4	4	5
13 10	79	.8976	.8982	.8987	.8993	.8998	.9004	.9009	.9015	.9020	.9025	1	1	2	2	3	3	4	4	5
13 20	80	.9031	.9036	.9042	.9047	.9053	.9058	.9063	.9069	.9074	.9079	1	1	2	2	3	3	4	4	5
13 30	81	.9085	.9090	.9096	.9101	.9106	.9112	.9117	.9122	.9128	.9133	1	1	2	2	3	3	4	4	5
13 40	82	.9138	.9143	.9149	.9154	.9159	.9165	.9170	.9175	.9180	.9186	1	1	2	2	3	3	4	4	5
13 50	83	.9191	.9196	.9201	.9206	.9212	.9217	.9222	.9227	.9232	.9238	1	1	2	2	3	3	4	4	5
14 0	84	.9243	.9248	.9253	.9258	.9263	.9269	.9274	.9279	.9284	.9289	1	1	2	2	3	3	4	4	5
14 10	85	.9294	.9299	.9304	.9309	.9315	.9320	.9325	.9330	.9335	.9340	1	1	2	2	3	3	4	4	5
14 20	86	.9345	.9350	.9355	.9360	.9365	.9370	.9375	.9380	.9385	.9390	1	1	2	2	3	3	4	4	5
14 30	87	.9395	.9400	.9405	.9410	.9415	.9420	.9425	.9430	.9435	.9440	0	1	1	2	2	3	3	4	4
14 40	88	.9445	.9450	.9455	.9460	.9465	.9469	.9474	.9479	.9484	.9489	0	1	1	2	2	3	3	4	4
14 50	89	.9494	.9499	.9504	.9509	.9513	.9518	.9523	.9528	.9533	.9538	0	1	1	2	2	3	3	4	4
15 0	90	.9542	.9547	.9552	.9557	.9562	.9566	.9571	.9576	.9581	.9586	0	1	1	2	2	3	3	4	4
15 10	91	.9590	.9595	.9600	.9605	.9609	.9614	.9619	.9624	.9628	.9633	0	1	1	2	2	3	3	4	4
15 20	92	.9638	.9643	.9647	.9652	.9657	.9661	.9666	.9671	.9675	.9680	0	1	1	2	2	3	3	4	4
15 30	93	.9685	.9689	.9694	.9699	.9703	.9708	.9713	.9717	.9722	.9727	0	1	1	2	2	3	3	4	4
15 40	94	.9731	.9736	.9741	.9745	.9750	.9754	.9759	.9763	.9768	.9773	0	1	1	2	2	3	3	4	4
15 50	95	.9777	.9782	.9786	.9791	.9795	.9800	.9805	.9809	.9814	.9818	0	1	1	2	2	3	3	4	4
16 0	96	.9823	.9827	.9832	.9836	.9841	.9845	.9850	.9854	.9859	.9863	0	1	1	2	2	3	3	4	4
16 10	97	.9868	.9872	.9877	.9881	.9886	.9890	.9894	.9899	.9903	.9908	0	1	1	2	2	3	3	4	4
16 20	98	.9912	.9917	.9921	.9926	.9930	.9934	.9939	.9943	.9948	.9952	0	1	1	2	2	3	3	4	4
16 30	99	.9956	.9961	.9965	.9969	.9974	.9978	.9983	.9987	.9991	.9996	0	1	1	2	2	3	3	3	4

CONSTANTS.

For converting

Sidereal Time into Mean Solar Time	log.	9.9988126
Mean Solar Time into Sidereal Time	"	0.0011874
Sidereal Time in Arc into Mean Solar Time	"	8.8227213
Mean Solar Time into Sidereal Time in Arc	"	1.1772787

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TABLE OF ANTILOGARITHMS.

Log.	0	1	2	3	4	5	6	7	8	9	Proportional Parts.								
											1	2	3	4	5	6	7	8	9
.00	1000	1002	1005	1007	1009	1012	1014	1016	1019	1021	0	0	1	1	1	1	2	2	2
.01	1023	1026	1028	1030	1033	1035	1038	1040	1042	1045	0	0	1	1	1	1	2	2	2
.02	1047	1050	1052	1054	1057	1059	1062	1064	1067	1069	0	0	1	1	1	1	2	2	2
.03	1072	1074	1076	1079	1081	1084	1086	1089	1091	1094	0	0	1	1	1	1	2	2	2
.04	1096	1099	1102	1104	1107	1109	1112	1114	1117	1119	0	1	1	1	1	2	2	2	2
.05	1122	1125	1127	1130	1132	1135	1138	1140	1143	1146	0	1	1	1	1	2	2	2	2
.06	1148	1151	1153	1156	1159	1161	1164	1167	1169	1172	0	1	1	1	1	2	2	2	2
.07	1175	1178	1180	1183	1186	1189	1191	1194	1197	1199	0	1	1	1	1	2	2	2	2
.08	1202	1205	1208	1211	1213	1216	1219	1222	1225	1227	0	1	1	1	1	2	2	2	3
.09	1230	1233	1236	1239	1242	1245	1247	1250	1253	1256	0	1	1	1	1	2	2	2	3
.10	1259	1262	1265	1268	1271	1274	1276	1279	1282	1285	0	1	1	1	1	2	2	2	3
.11	1288	1291	1294	1297	1300	1303	1306	1309	1312	1315	0	1	1	1	2	2	2	2	3
.12	1318	1321	1324	1327	1330	1334	1337	1340	1343	1346	0	1	1	1	2	2	2	2	3
.13	1349	1352	1355	1358	1361	1365	1368	1371	1374	1377	0	1	1	1	2	2	2	3	3
.14	1380	1384	1387	1390	1393	1396	1400	1403	1406	1409	0	1	1	1	2	2	2	3	3
.15	1413	1416	1419	1422	1426	1429	1432	1435	1439	1442	0	1	1	1	2	2	2	3	3
.16	1445	1449	1452	1455	1459	1462	1466	1469	1472	1476	0	1	1	1	2	2	2	3	3
.17	1479	1483	1486	1489	1493	1496	1500	1503	1507	1510	0	1	1	1	2	2	2	3	3
.18	1514	1517	1521	1524	1528	1531	1535	1538	1542	1545	0	1	1	1	2	2	2	3	3
.19	1549	1552	1556	1560	1563	1567	1570	1574	1578	1581	0	1	1	1	2	2	3	3	3
.20	1585	1589	1592	1596	1600	1603	1607	1611	1614	1618	0	1	1	1	2	2	3	3	3
.21	1622	1626	1629	1633	1637	1641	1644	1648	1652	1656	0	1	1	2	2	2	3	3	3
.22	1660	1663	1667	1671	1675	1679	1683	1687	1690	1694	0	1	1	2	2	2	3	3	3
.23	1698	1702	1706	1710	1714	1718	1722	1726	1730	1734	0	1	1	2	2	2	3	3	4
.24	1738	1742	1746	1750	1754	1758	1762	1766	1770	1774	0	1	1	2	2	2	3	3	4
.25	1778	1782	1786	1791	1795	1799	1803	1807	1811	1816	0	1	1	2	2	2	3	3	4
.26	1820	1824	1828	1832	1837	1841	1845	1849	1854	1858	0	1	1	2	2	3	3	3	4
.27	1862	1866	1871	1875	1879	1884	1888	1892	1897	1901	0	1	1	2	2	3	3	3	4
.28	1905	1910	1914	1919	1923	1928	1932	1936	1941	1945	0	1	1	2	2	3	3	4	4
.29	1950	1954	1959	1963	1968	1972	1977	1982	1986	1991	0	1	1	2	2	3	3	4	4
.30	1995	2000	2004	2009	2014	2018	2023	2028	2032	2037	0	1	1	2	2	3	3	4	4
.31	2042	2046	2051	2056	2061	2065	2070	2075	2080	2084	0	1	1	2	2	3	3	4	4
.32	2089	2094	2099	2104	2109	2113	2118	2123	2128	2133	0	1	1	2	2	3	3	4	4
.33	2138	2143	2148	2153	2158	2163	2168	2173	2178	2183	0	1	1	2	2	3	3	4	4
.34	2188	2193	2198	2203	2208	2213	2218	2223	2228	2234	1	1	2	2	3	3	4	4	5
.35	2239	2244	2249	2254	2259	2265	2270	2275	2280	2286	1	1	2	2	3	3	4	4	5
.36	2291	2296	2301	2307	2312	2317	2323	2328	2333	2339	1	1	2	2	3	3	4	4	5
.37	2344	2350	2355	2360	2366	2371	2377	2382	2388	2393	1	1	2	2	3	3	4	4	5
.38	2399	2404	2410	2415	2421	2427	2432	2438	2443	2449	1	1	2	2	3	3	4	4	5
.39	2455	2460	2466	2472	2477	2483	2489	2495	2500	2506	1	1	2	2	3	3	4	5	5
.40	2512	2518	2523	2529	2535	2541	2547	2553	2559	2564	1	1	2	2	3	4	4	5	5
.41	2570	2576	2582	2588	2594	2600	2606	2612	2618	2624	1	1	2	2	3	4	4	5	5
.42	2630	2636	2642	2649	2655	2661	2667	2673	2679	2685	1	1	2	2	3	4	4	5	6
.43	2692	2698	2704	2710	2716	2723	2729	2735	2742	2748	1	1	2	3	3	4	4	5	6
.44	2754	2761	2767	2773	2780	2786	2793	2799	2805	2812	1	1	2	3	3	4	4	5	6
.45	2818	2825	2831	2838	2844	2851	2858	2864	2871	2877	1	1	2	3	3	4	5	5	6
.46	2884	2891	2897	2904	2911	2917	2924	2931	2938	2944	1	1	2	3	3	4	5	5	6
.47	2951	2958	2965	2972	2979	2985	2992	2999	3006	3013	1	1	2	3	3	4	5	5	6
.48	3020	3027	3034	3041	3048	3055	3062	3069	3076	3083	1	1	2	3	4	4	5	6	6
.49	3090	3097	3105	3112	3119	3126	3133	3141	3148	3155	1	1	2	3	4	4	5	6	6

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TABLE OF ANTILOGARITHMS.

Log.	0	1	2	3	4	5	6	7	8	9	Proportional Parts. 1	2	3	4	5	6	7	8	9
.50	3162	3170	3177	3184	3192	3199	3206	3214	3221	3228	1	1	2	3	4	4	5	6	7
.51	3236	3243	3251	3258	3266	3273	3281	3289	3296	3304	1	2	2	3	4	5	5	6	7
.52	3311	3319	3327	3334	3342	3350	3357	3365	3373	3381	1	2	2	3	4	5	5	6	7
.53	3388	3396	3404	3412	3420	3428	3436	3443	3451	3459	1	2	2	3	4	5	6	6	7
.54	3467	3475	3483	3491	3499	3508	3516	3524	3532	3540	1	2	2	3	4	5	6	6	7
.55	3548	3556	3565	3573	3581	3589	3597	3606	3614	3622	1	2	2	3	4	5	6	7	7
.56	3631	3639	3648	3656	3664	3673	3681	3690	3698	3707	1	2	3	3	4	5	6	7	8
.57	3715	3724	3733	3741	3750	3758	3767	3776	3784	3793	1	2	3	3	4	5	6	7	8
.58	3802	3811	3819	3828	3837	3846	3855	3864	3873	3882	1	2	3	4	4	5	6	7	8
.59	3890	3899	3908	3917	3926	3936	3945	3954	3963	3972	1	2	3	4	5	5	6	7	8
.60	3981	3990	3999	4009	4018	4027	4036	4046	4055	4064	1	2	3	4	5	6	6	7	8
.61	4074	4083	4093	4102	4111	4121	4130	4140	4150	4159	1	2	3	4	5	6	7	8	9
.62	4169	4178	4188	4198	4207	4217	4227	4236	4246	4256	1	2	3	4	5	6	7	8	9
.63	4266	4276	4285	4295	4305	4315	4325	4335	4345	4355	1	2	3	4	5	6	7	8	9
.64	4365	4375	4385	4395	4406	4416	4426	4436	4446	4457	1	2	3	4	5	6	7	8	9
.65	4467	4477	4487	4498	4508	4519	4529	4539	4550	4560	1	2	3	4	5	6	7	8	9
.66	4571	4581	4592	4603	4613	4624	4634	4645	4656	4667	1	2	3	4	5	6	7	9	10
.67	4677	4688	4699	4710	4721	4732	4742	4753	4764	4775	1	2	3	4	5	7	8	9	10
.68	4786	4797	4808	4819	4831	4842	4853	4864	4875	4887	1	2	3	4	6	7	8	9	10
.69	4898	4909	4920	4932	4943	4955	4966	4977	4989	5000	1	2	3	5	6	7	8	9	10
.70	5012	5023	5035	5047	5058	5070	5082	5093	5105	5117	1	2	4	5	6	7	8	9	11
.71	5129	5140	5152	5164	5176	5188	5200	5212	5224	5236	1	2	4	5	6	7	8	10	11
.72	5248	5260	5272	5284	5297	5309	5321	5333	5346	5358	1	2	4	5	6	7	9	10	11
.73	5370	5383	5395	5408	5420	5433	5445	5458	5470	5483	1	3	4	5	6	8	9	10	11
.74	5495	5508	5521	5534	5546	5559	5572	5585	5598	5610	1	3	4	5	6	8	9	10	12
.75	5623	5636	5649	5662	5675	5689	5702	5715	5728	5741	1	3	4	5	7	8	9	10	12
.76	5754	5768	5781	5794	5808	5821	5834	5848	5861	5875	1	3	4	5	7	8	9	11	12
.77	5888	5902	5916	5929	5943	5957	5970	5984	5998	6012	1	3	4	5	7	8	10	11	12
.78	6026	6039	6053	6067	6081	6095	6109	6124	6138	6152	1	3	4	6	7	8	10	11	13
.79	6166	6180	6194	6209	6223	6237	6252	6266	6281	6295	1	3	4	6	7	9	10	11	13
.80	6310	6324	6339	6353	6368	6383	6397	6412	6427	6442	1	3	4	6	7	9	10	12	13
.81	6457	6471	6486	6501	6516	6531	6546	6561	6577	6592	2	3	5	6	8	9	11	12	14
.82	6607	6622	6637	6653	6668	6683	6699	6714	6730	6745	2	3	5	6	8	9	11	12	14
.83	6761	6776	6792	6808	6823	6839	6855	6871	6887	6902	2	3	5	6	8	9	11	13	14
.84	6918	6934	6950	6966	6982	6998	7015	7031	7047	7063	2	3	5	6	8	10	11	13	15
.85	7079	7096	7112	7129	7145	7161	7178	7194	7211	7228	2	3	5	7	8	10	12	13	15
.86	7244	7261	7278	7295	7311	7328	7345	7362	7379	7396	2	3	5	7	8	10	12	13	15
.87	7413	7430	7447	7464	7482	7499	7516	7534	7551	7568	2	3	5	7	9	10	12	14	16
.88	7586	7603	7621	7638	7656	7674	7691	7709	7727	7745	2	4	5	7	9	11	12	14	16
.89	7762	7780	7798	7816	7834	7852	7870	7889	7907	7925	2	4	5	7	9	11	13	14	16
.90	7943	7962	7980	7998	8017	8035	8054	8072	8091	8110	2	4	6	7	9	11	13	15	17
.91	8128	8147	8166	8185	8204	8222	8241	8260	8279	8299	2	4	6	8	9	11	13	15	17
.92	8318	8337	8356	8375	8395	8414	8433	8453	8472	8492	2	4	6	8	10	12	14	15	17
.93	8511	8531	8551	8570	8590	8610	8630	8650	8670	8690	2	4	6	8	10	12	14	16	18
.94	8710	8730	8750	8770	8790	8810	8831	8851	8872	8892	2	4	6	8	10	12	14	16	18
.95	8913	8933	8954	8974	8995	9016	9036	9057	9078	9099	2	4	6	8	10	12	15	17	19
.96	9120	9141	9162	9183	9204	9226	9247	9268	9290	9311	2	4	6	8	11	13	15	17	19
.97	9333	9354	9376	9397	9419	9441	9462	9484	9506	9528	2	4	7	9	11	13	15	17	20
.98	9550	9572	9594	9616	9638	9661	9683	9705	9727	9750	2	4	7	9	11	13	16	18	20
.99	9772	9795	9817	9840	9863	9886	9908	9931	9954	9977	2	5	7	9	11	14	16	18	20

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LOGARITHMS OF SINES AND TANGENTS.

	0°				1°				
	Sin.	Cos.	Tang.	Cotan.	Sin.	Cos.	Tang.	Cotan.	
0′		0.0000			8.2419	9.9999	8.2419	1.7581	60′
1	6.4637	.0000	6.4637	3.5363	.2490	.9999	.2491	.7509	59
2	.7648	.0000	.7648	.2352	.2561	.9999	.2562	.7438	58
3	6.9408	.0000	6.9408	3.0592	.2630	.9999	.2631	.7369	57
4	7.0658	.0000	7.0658	2.9342	.2699	.9999	.2700	.7300	56
5	.1627	.0000	.1627	.8373	.2766	.9999	.2767	.7233	55
6	.2419	.0000	.2419	.7581	.2832	.9999	.2833	.7167	54
7	.3088	.0000	.3088	.6912	.2898	.9999	.2899	.7101	53
8	.3668	.0000	.3668	.6332	.2962	.9999	.2963	.7037	52
9	.4180	.0000	.4180	.5820	.3025	.9999	.3026	.6974	51
10	.4637	.0000	.4637	.5363	.3088	.9999	.3089	.6911	50
11	.5051	.0000	.5051	.4949	.3150	.9999	.3150	.6850	49
12	.5429	.0000	.5429	.4571	.3210	.9999	.3211	.6789	48
13	.5777	.0000	.5777	.4223	.3270	.9999	.3271	.6729	47
14	.6099	.0000	.6099	.3901	.3329	.9999	.3330	.6670	46
15	.6398	.0000	.6398	.3602	.3388	.9999	.3389	.6611	45
16	.6678	.0000	.6678	.3322	.3445	.9999	.3446	.6554	44
17	.6942	.0000	.6942	.3058	.3502	.9999	.3503	.6497	43
18	.7190	.0000	.7190	.2810	.3558	.9999	.3559	.6441	42
19	.7425	.0000	.7425	.2575	.3613	.9999	.3614	.6386	41
20	.7648	.0000	.7648	.2352	.3668	.9999	.3669	.6331	40
21	.7859	.0000	.7860	.2140	.3722	.9999	.3723	.6277	39
22	.8061	.0000	.8062	.1938	.3775	.9999	.3776	.6224	38
23	.8255	.0000	.8255	.1745	.3828	.9999	.3829	.6171	37
24	.8439	.0000	.8439	.1561	.3880	.9999	.3881	.6119	36
25	.8617	.0000	.8617	.1383	.3931	.9999	.3932	.6068	35
26	.8787	.0000	.8787	.1213	.3982	.9999	.3983	.6017	34
27	.8951	.0000	.8951	.1049	.4032	.9999	.4033	.5967	33
28	.9109	.0000	.9109	.0891	.4082	.9999	.4083	.5917	32
29	.9261	.0000	.9261	.0739	.4131	.9999	.4132	.5868	31
30	.9408	.0000	.9409	.0591	.4179	.9999	.4181	.5819	30
31	.9551	.0000	.9551	.0449	.4227	.9998	.4229	.5771	29
32	.9689	.0000	.9689	.0311	.4275	.9998	.4276	.5724	28
33	.9822	.0000	.9823	.0177	.4322	.9998	.4323	.5677	27
34	7.9952	.0000	7.9952	2.0048	.4368	.9998	.4370	.5630	26
35	8.0078	.0000	8.0078	1.9922	.4414	.9998	.4416	.5584	25
36	.0200	.0000	.0200	.9800	.4459	.9998	.4461	.5539	24
37	.0319	.0000	.0319	.9681	.4504	.9998	.4506	.5494	23
38	.0435	.0000	.0435	.9565	.4549	.9998	.4551	.5449	22
39	.0548	.0000	.0548	.9452	.4593	.9998	.4595	.5405	21
40	.0658	.0000	.0658	.9342	.4637	.9998	.4638	.5362	20
41	.0765	.0000	.0765	.9235	.4680	.9998	.4682	.5318	19
42	.0870	.0000	.0870	.9130	.4723	.9998	.4725	.5275	18
43	.0972	.0000	.0972	.9028	.4765	.9998	.4767	.5233	17
44	.1072	.0000	.1072	.8928	.4807	.9998	.4809	.5191	16
45	.1169	.0000	.1170	.8830	.4848	.9998	.4851	.5149	15
46	.1265	.0000	.1265	.8735	.4890	.9998	.4892	.5108	14
47	.1358	.0000	.1359	.8641	.4930	.9998	.4933	.5067	13
48	.1450	.0000	.1450	.8550	.4971	.9998	.4973	.5027	12
49	.1539	.0000	.1540	.8460	.5011	.9998	.5013	.4987	11
50	.1627	.0000	.1627	.8373	.5050	.9998	.5053	.4947	10
51	.1713	.0000	.1713	.8287	.5090	.9998	.5092	.4908	9
52	.1797	0.0000	.1798	.8202	.5129	.9998	.5131	.4869	8
53	.1880	9.9999	.1880	.8120	.5167	.9998	.5170	.4830	7
54	.1961	.9999	.1962	.8038	.5206	.9998	.5208	.4792	6
55	.2041	.9999	.2041	.7959	.5243	.9998	.5246	.4754	5
56	.2119	.9999	.2120	.7880	.5281	.9998	.5283	.4717	4
57	.2196	.9999	.2196	.7804	.5318	.9997	.5321	.4679	3
58	.2271	.9999	.2272	.7728	.5355	.9997	.5358	.4642	2
59	.2346	.9999	.2346	.7654	.5392	.9997	.5394	.4606	1
60	8.2419	9.9999	8.2419	1.7581	8.5428	9.9997	8.5431	1.4569	0
	Cos.	Sin.	Cotan.	Tang.	Cos.	Sin.	Cotan.	Tang.	
	89°				88°				

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LOGARITHMS OF SINES AND TANGENTS.

	2°				3°				4°				
	Sin.	Cos.	Tang.	Cotan.	Sin.	Cos.	Tang.	Cotan.	Sin.	Cos.	Tang.	Cotan.	
0′	8.5428	9.9997	8.5431	1.4569	8.7188	9.9994	8.7194	1.2806	8.8436	9.9989	8.8446	1.1554	60′
1	.5464	.9997	.5467	.4533	.7212	.9994	.7218	.2782	.8454	.9989	.8465	.1535	59
2	.5500	.9997	.5503	.4497	.7236	.9994	.7242	.2758	.8472	.9989	.8483	.1517	58
3	.5535	.9997	.5538	.4462	.7260	.9994	.7266	.2734	.8490	.9989	.8501	.1499	57
4	.5571	.9997	.5573	.4427	.7283	.9994	.7290	.2710	.8508	.9989	.8518	.1482	56
5	.5605	.9997	.5608	.4392	.7307	.9994	.7313	.2687	.8525	.9989	.8536	.1464	55
6	.5640	.9997	.5643	.4357	.7330	.9994	.7337	.2663	.8543	.9989	.8554	.1446	54
7	.5674	.9997	.5677	.4323	.7354	.9994	.7360	.2640	.8560	.9989	.8572	.1428	53
8	.5708	.9997	.5711	.4289	.7377	.9994	.7383	.2617	.8578	.9989	.8589	.1411	52
9	.5742	.9997	.5745	.4255	.7400	.9993	.7406	.2594	.8595	.9989	.8607	.1393	51
10	.5776	.9997	.5779	.4221	.7423	.9993	.7429	.2571	.8613	.9989	.8624	.1376	50
11	.5809	.9997	.5812	.4188	.7445	.9993	.7452	.2548	.8630	.9988	.8642	.1358	49
12	.5842	.9997	.5845	.4155	.7468	.9993	.7475	.2525	.8647	.9988	.8659	.1341	48
13	.5875	.9997	.5878	.4122	.7491	.9993	.7497	.2503	.8665	.9988	.8676	.1324	47
14	.5907	.9997	.5911	.4089	.7513	.9993	.7520	.2480	.8682	.9988	.8694	.1306	46
15	.5939	.9997	.5943	.4057	.7535	.9993	.7542	.2458	.8699	.9988	.8711	.1289	45
16	.5972	.9997	.5975	.4025	.7557	.9993	.7565	.2435	.8716	.9988	.8728	.1272	44
17	.6003	.9997	.6007	.3993	.7580	.9993	.7587	.2413	.8733	.9988	.8745	.1255	43
18	.6035	.9996	.6038	.3962	.7602	.9993	.7609	.2391	.8749	.9988	.8762	.1238	42
19	.6066	.9996	.6070	.3930	.7623	.9993	.7631	.2369	.8766	.9988	.8778	.1222	41
20	.6097	.9996	.6101	.3899	.7645	.9993	.7652	.2348	.8783	.9988	.8795	.1205	40
21	.6128	.9996	.6132	.3868	.7667	.9993	.7674	.2326	.8799	.9987	.8812	.1188	39
22	.6159	.9996	.6163	.3837	.7688	.9992	.7696	.2304	.8816	.9987	.8829	.1171	38
23	.6189	.9996	.6193	.3807	.7710	.9992	.7717	.2283	.8833	.9987	.8845	.1155	37
24	.6220	.9996	.6223	.3777	.7731	.9992	.7739	.2261	.8849	.9987	.8862	.1138	36
25	.6250	.9996	.6254	.3746	.7752	.9992	.7760	.2240	.8865	.9987	.8878	.1122	35
26	.6279	.9996	.6283	.3717	.7773	.9992	.7781	.2219	.8882	.9987	.8895	.1105	34
27	.6309	.9996	.6313	.3687	.7794	.9992	.7802	.2198	.8898	.9987	.8911	.1089	33
28	.6339	.9996	.6343	.3657	.7815	.9992	.7823	.2177	.8914	.9987	.8927	.1073	32
29	.6368	.9996	.6372	.3628	.7836	.9992	.7844	.2156	.8930	.9987	.8944	.1056	31
30	.6397	.9996	.6401	.3599	.7857	.9992	.7865	.2135	.8946	.9987	.8960	.1040	30
31	.6426	.9996	.6430	.3570	.7877	.9992	.7886	.2114	.8962	.9986	.8976	.1024	29
32	.6454	.9996	.6459	.3541	.7898	.9992	.7906	.2094	.8978	.9986	.8992	.1008	28
33	.6483	.9996	.6487	.3513	.7918	.9992	.7927	.2073	.8994	.9986	.9008	.0992	27
34	.6511	.9996	.6515	.3485	.7939	.9992	.7947	.2053	.9010	.9986	.9024	.0976	26
35	.6539	.9996	.6544	.3456	.7959	.9992	.7967	.2033	.9026	.9986	.9040	.0960	25
36	.6567	.9996	.6571	.3429	.7979	.9991	.7988	.2012	.9042	.9986	.9056	.0944	24
37	.6595	.9995	.6599	.3401	.7999	.9991	.8008	.1992	.9057	.9986	.9071	.0929	23
38	.6622	.9995	.6627	.3373	.8019	.9991	.8028	.1972	.9073	.9986	.9087	.0913	22
39	.6650	.9995	.6654	.3346	.8039	.9991	.8048	.1952	.9089	.9986	.9103	.0897	21
40	.6677	.9995	.6682	.3318	.8059	.9991	.8067	.1933	.9104	.9986	.9118	.0882	20
41	.6704	.9995	.6709	.3291	.8078	.9991	.8087	.1913	.9119	.9985	.9134	.0866	19
42	.6731	.9995	.6736	.3264	.8098	.9991	.8107	.1893	.9135	.9985	.9150	.0850	18
43	.6758	.9995	.6762	.3238	.8117	.9991	.8126	.1874	.9150	.9985	.9165	.0835	17
44	.6784	.9995	.6789	.3211	.8137	.9991	.8146	.1854	.9166	.9985	.9180	.0820	16
45	.6810	.9995	.6815	.3185	.8156	.9991	.8165	.1835	.9181	.9985	.9196	.0804	15
46	.6837	.9995	.6842	.3158	.8175	.9991	.8185	.1815	.9196	.9985	.9211	.0789	14
47	.6863	.9995	.6868	.3132	.8194	.9991	.8204	.1796	.9211	.9985	.9226	.0774	13
48	.6889	.9995	.6894	.3106	.8213	.9990	.8223	.1777	.9226	.9985	.9241	.0759	12
49	.6914	.9995	.6920	.3080	.8232	.9990	.8242	.1758	.9241	.9985	.9256	.0744	11
50	.6940	.9995	.6945	.3055	.8251	.9990	.8261	.1739	.9256	.9985	.9272	.0728	10
51	.6965	.9995	.6971	.3029	.8270	.9990	.8280	.1720	.9271	.9984	.9287	.0713	9
52	.6991	.9995	.6996	.3004	.8289	.9990	.8299	.1701	.9286	.9984	.9302	.0698	8
53	.7016	.9994	.7021	.2979	.8307	.9990	.8317	.1683	.9301	.9984	.9316	.0684	7
54	.7041	.9994	.7046	.2954	.8326	.9990	.8336	.1664	.9315	.9984	.9331	.0669	6
55	.7066	.9994	.7071	.2929	.8345	.9990	.8355	.1645	.9330	.9984	.9346	.0654	5
56	.7090	.9994	.7096	.2904	.8363	.9990	.8373	.1627	.9345	.9984	.9361	.0639	4
57	.7115	.9994	.7121	.2879	.8381	.9990	.8392	.1608	.9359	.9984	.9376	.0624	3
58	.7140	.9994	.7145	.2855	.8400	.9990	.8410	.1590	.9374	.9984	.9390	.0610	2
59	.7164	.9994	.7170	.2830	.8418	.9989	.8428	.1572	.9388	.9984	.9405	.0595	1
60	8.7188	9.9994	8.7194	1.2806	8.8436	9.9989	8.8446	1.1554	8.9403	9.9983	8.9420	1.0580	0
	Cos.	Sin.	Cotan.	Tang.	Cos.	Sin.	Cotan.	Tang.	Cos.	Sin.	Cotan.	Tang.	
	87°				86°				85°				

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LOGARITHMS OF SINES AND TANGENTS.

Arc.	Sin.	Diff.	Cos.	Df	Tan.	Diff.	Cotan.	Arc.	Arc.	Sin.	Df	Cos.	Df	Tan.	Df	Cotan.	Arc.
° ′								° ′	° ′								° ′
5 0	8.9403	142	9.9983	1	8.9420	143	1.0580	85 0	15 0	9.4130	47	9.9849	3	9.4281	50	0.5719	75 0
10	.9545	137	.9982	1	.9563	138	.0437	50	10	.4177	46	.9846	3	.4331	50	.5669	50
20	.9682	134	.9981	1	.9701	135	.0299	40	20	.4223	46	.9843	4	.4381	49	.5619	40
30	.9816	129	.9980	1	.9836	130	.0164	30	30	.4269	45	.9839	3	.4430	49	.5570	30
40	8.9945	125	.9979	2	8.9966	127	1.0034	20	40	.4314	45	.9836	4	.4479	48	.5521	20
50	9.0070	122	.9977	1	9.0093	123	0.9907	10	50	.4359	44	.9832	4	.4527	48	.5473	10
6 0	.0192	119	.9976	1	.0216	120	.9784	84 0	16 0	.4403	44	.9828	3	.4575	47	.5425	74 0
10	.0311	115	.9975	2	.0336	117	.9664	50	10	.4447	44	.9825	4	.4622	47	.5378	50
20	.0426	113	.9973	1	.0453	114	.9547	40	20	.4491	42	.9821	4	.4669	47	.5331	40
30	.0539	109	.9972	1	.0567	111	.9433	30	30	.4533	43	.9817	3	.4716	46	.5284	30
40	.0648	107	.9971	2	.0678	108	.9322	20	40	.4576	42	.9814	4	.4762	46	.5238	20
50	.0755	104	.9969	1	.0786	105	.9214	10	50	.4618	41	.9810	4	.4808	45	.5192	10
7 0	.0859	102	.9968	2	.0891	104	.9109	83 0	17 0	.4659	41	.9806	4	.4853	45	.5147	73 0
10	.0961	99	.9966	2	.0995	101	.9005	50	10	.4700	41	.9802	4	.4898	45	.5102	50
20	.1060	97	.9964	1	.1096	98	.8904	40	20	.4741	40	.9798	4	.4943	44	.5057	40
30	.1157	95	.9963	2	.1194	97	.8806	30	30	.4781	40	.9794	4	.4987	44	.5013	30
40	.1252	93	.9961	2	.1291	94	.8709	20	40	.4821	40	.9790	4	.5031	44	.4969	20
50	.1345	91	.9959	1	.1385	93	.8615	10	50	.4861	39	.9786	4	.5075	43	.4925	10
8 0	.1436	89	.9958	2	.1478	91	.8522	82 0	18 0	.4900	39	.9782	4	.5118	43	.4882	72 0
10	.1525	87	.9956	2	.1569	89	.8431	50	10	.4939	38	.9778	4	.5161	42	.4839	50
20	.1612	85	.9954	2	.1658	87	.8342	40	20	.4977	38	.9774	4	.5203	42	.4797	40
30	.1697	84	.9952	2	.1745	86	.8255	30	30	.5015	37	.9770	5	.5245	42	.4755	30
40	.1781	82	.9950	2	.1831	84	.8169	20	40	.5052	38	.9765	4	.5287	42	.4713	20
50	.1863	80	.9948	2	.1915	82	.8085	10	50	.5090	36	.9761	4	.5329	41	.4671	10
9 0	.1943	79	.9946	2	.1997	81	.8003	81 0	19 0	.5126	37	.9757	5	.5370	41	.4630	71 0
10	.2022	78	.9944	2	.2078	80	.7922	50	10	.5163	36	.9752	4	.5411	40	.4589	50
20	.2100	76	.9942	2	.2158	78	.7842	40	20	.5199	36	.9748	5	.5451	40	.4549	40
30	.2176	75	.9940	2	.2236	77	.7764	30	30	.5235	35	.9743	4	.5491	40	.4509	30
40	.2251	73	.9938	2	.2313	76	.7687	20	40	.5270	36	.9739	5	.5531	40	.4469	20
50	.2324	73	.9936	2	.2389	74	.7611	10	50	.5306	35	.9734	4	.5571	40	.4429	10
10 0	.2397	71	.9934	3	.2463	73	.7537	80 0	20 0	.5341	34	.9730	5	.5611	39	.4389	70 0
10	.2468	70	.9931	2	.2536	73	.7464	50	10	.5375	34	.9725	4	.5650	39	.4350	50
20	.2538	68	.9929	2	.2609	71	.7391	40	20	.5409	34	.9721	5	.5689	38	.4311	40
30	.2606	68	.9927	3	.2680	70	.7320	30	30	.5443	34	.9716	5	.5727	39	.4273	30
40	.2674	66	.9924	2	.2750	69	.7250	20	40	.5477	33	.9711	5	.5766	38	.4234	20
50	.2740	66	.9922	3	.2819	68	.7181	10	50	.5510	33	.9706	4	.5804	38	.4196	10
11 0	.2806	64	.9919	2	.2887	66	.7113	79 0	21 0	.5543	33	.9702	5	.5842	37	.4158	69 0
10	.2870	64	.9917	3	.2953	67	.7047	50	10	.5576	33	.9697	5	.5879	38	.4121	50
20	.2934	63	.9914	2	.3020	65	.6980	40	20	.5609	32	.9692	5	.5917	37	.4083	40
30	.2997	61	.9912	3	.3085	64	.6915	30	30	.5641	32	.9687	5	.5954	37	.4046	30
40	.3058	61	.9909	2	.3149	63	.6851	20	40	.5673	31	.9682	5	.5991	37	.4009	20
50	.3119	60	.9907	3	.3212	63	.6788	10	50	.5704	32	.9677	5	.6028	36	.3972	10
12 0	.3179	59	.9904	3	.3275	61	.6725	78 0	22 0	.5736	31	.9672	5	.6064	36	.3936	68 0
10	.3238	58	.9901	2	.3336	61	.6664	50	10	.5767	31	.9667	6	.6100	36	.3900	50
20	.3296	57	.9899	3	.3397	61	.6603	40	20	.5798	30	.9661	5	.6136	36	.3864	40
30	.3353	57	.9896	3	.3458	59	.6542	30	30	.5828	31	.9656	5	.6172	36	.3828	30
40	.3410	56	.9893	3	.3517	59	.6483	20	40	.5859	30	.9651	5	.6208	35	.3792	20
50	.3466	55	.9890	3	.3576	58	.6424	10	50	.5889	30	.9646	6	.6243	36	.3757	10
13 0	.3521	54	.9887	3	.3634	57	.6366	77 0	23 0	.5919	29	.9640	5	.6279	35	.3721	67 0
10	.3575	54	.9884	3	.3691	57	.6309	50	10	.5948	30	.9635	6	.6314	34	.3686	50
20	.3629	53	.9881	3	.3748	56	.6252	40	20	.5978	29	.9629	5	.6348	35	.3652	40
30	.3682	52	.9878	3	.3804	55	.6196	30	30	.6007	29	.9624	6	.6383	34	.3617	30
40	.3734	52	.9875	3	.3859	55	.6141	20	40	.6036	29	.9618	5	.6417	35	.3583	20
50	.3786	51	.9872	3	.3914	54	.6086	10	50	.6065	28	.9613	6	.6452	34	.3548	10
14 0	.3837	50	.9869	3	.3968	53	.6032	76 0	24 0	.6093	28	.9607	5	.6486	34	.3514	66 0
10	.3887	50	.9866	3	.4021	53	.5979	50	10	.6121	28	.9602	6	.6520	33	.3480	50
20	.3937	49	.9863	4	.4074	53	.5926	40	20	.6149	28	.9596	6	.6553	34	.3447	40
30	.3986	49	.9859	3	.4127	51	.5873	30	30	.6177	28	.9590	6	.6587	33	.3413	30
40	.4035	48	.9856	3	.4178	52	.5822	20	40	.6205	27	.9584	5	.6620	34	.3380	20
50	.4083	47	.9853	4	.4230	51	.5770	10	50	.6232	27	.9579	6	.6654	33	.3346	10
15 0	9.4130	47	9.9849	3	9.4281	50	0.5719	75 0	25 0	0.6259	27	9.9573	7	9.6687	33	0.3313	65 0
Arc.	Cos.	Diff.	Sin.	Df	Cotan.	Diff.	Tan.	Arc.	Arc.	Cos.	Df	Sin.	Df	Cotan.	Df	Tan.	Arc.

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LOGARITHMS OF SINES AND TANGENTS.

Arc.	Sin.	Dif.	Cos.	Dif.	Tan.	Dif.	Cotan.	Arc.	Arc.	Sin.	Dif.	Cos.	Dif.	Tan.	Dif.	Cotan.	Arc.
° ′								° ′	° ′								° ′
25 0	9.6259	27	9.9573	6	9.6687	33	0.3313	65 0	35 0	9.7586	18	9.9134	9	9.8452	27	0.1548	55 0
10	.6286	27	.9567	6	.6720	32	.3280	50	10	.7604	18	.9125	9	.8479	27	.1521	50
20	.6313	27	.9561	6	.6752	33	.3248	40	20	.7622	18	.9116	9	.8506	27	.1494	40
30	.6340	26	.9555	6	.6785	32	.3215	30	30	.7640	17	.9107	9	.8533	26	.1467	30
40	.6366	26	.9549	6	.6817	33	.3183	20	40	.7657	18	.9098	9	.8559	27	.1441	20
50	.6392	26	.9543	6	.6850	32	.3150	10	50	.7675	17	.9089	9	.8586	27	.1414	10
26 0	.6418	26	.9537	7	.6882	32	.3118	64 0	36 0	.7692	18	.9080	10	.8613	26	.1387	54 0
10	.6444	26	.9530	6	.6914	32	.3086	50	10	.7710	17	.9070	9	.8639	27	.1361	50
20	.6470	25	.9524	6	.6946	31	.3054	40	20	.7727	17	.9061	9	.8666	26	.1334	40
30	.6495	26	.9518	6	.6977	32	.3023	30	30	.7744	17	.9052	10	.8692	26	.1308	30
40	.6521	25	.9512	7	.7009	31	.2991	20	40	.7761	17	.9042	9	.8718	27	.1282	20
50	.6546	24	.9505	6	.7040	32	.2960	10	50	.7778	17	.9033	10	.8745	26	.1255	10
27 0	.6570	25	.9499	7	.7072	31	.2928	63 0	37 0	.7795	16	.9023	9	.8771	26	.1229	53 0
10	.6595	25	.9492	6	.7103	31	.2897	50	10	.7811	17	.9014	10	.8797	27	.1203	50
20	.6620	24	.9486	7	.7134	31	.2866	40	20	.7828	16	.9004	9	.8824	26	.1176	40
30	.6644	24	.9479	6	.7165	31	.2835	30	30	.7844	17	.8995	10	.8850	26	.1150	30
40	.6668	24	.9473	7	.7196	30	.2804	20	40	.7861	16	.8985	10	.8876	26	.1124	20
50	.6692	24	.9466	7	.7226	31	.2774	10	50	.7877	16	.8975	10	.8902	26	.1098	10
28 0	.6716	24	.9459	6	.7257	30	.2743	62 0	38 0	.7893	17	.8965	10	.8928	26	.1072	52 0
10	.6740	23	.9453	7	.7287	30	.2713	50	10	.7910	16	.8955	10	.8954	26	.1046	50
20	.6763	24	.9446	7	.7317	31	.2683	40	20	.7926	15	.8945	10	.8980	26	.1020	40
30	.6787	23	.9439	7	.7348	30	.2652	30	30	.7941	16	.8935	10	.9006	26	.0994	30
40	.6810	23	.9432	7	.7378	30	.2622	20	40	.7957	16	.8925	10	.9032	26	.0968	20
50	.6833	23	.9425	7	.7408	30	.2592	10	50	.7973	16	.8915	10	.9058	26	.0942	10
29 0	.6856	22	.9418	7	.7438	29	.2562	61 0	39 0	.7989	15	.8905	10	.9084	26	.0916	51 0
10	.6878	23	.9411	7	.7467	30	.2533	50	10	.8004	16	.8895	11	.9110	25	.0890	50
20	.6901	22	.9404	7	.7497	29	.2503	40	20	.8020	15	.8884	10	.9135	26	.0865	40
30	.6923	23	.9397	7	.7526	30	.2474	30	30	.8035	15	.8874	10	.9161	26	.0839	30
40	.6946	22	.9390	7	.7556	29	.2444	20	40	.8050	16	.8864	11	.9187	25	.0813	20
50	.6968	22	.9383	8	.7585	29	.2415	10	50	.8066	15	.8853	10	.9212	26	.0788	10
30 0	.6990	22	.9375	7	.7614	30	.2386	60 0	40 0	.8081	15	.8843	11	.9238	26	.0762	50 0
10	.7012	21	.9368	7	.7644	29	.2356	50	10	.8096	15	.8832	11	.9264	25	.0736	50
20	.7033	22	.9361	8	.7673	28	.2327	40	20	.8111	14	.8821	11	.9289	26	.0711	40
30	.7055	21	.9353	7	.7701	29	.2299	30	30	.8125	15	.8810	10	.9315	26	.0685	30
40	.7076	21	.9346	8	.7730	29	.2270	20	40	.8140	15	.8800	11	.9341	25	.0659	20
50	.7097	21	.9338	7	.7759	29	.2241	10	50	.8155	14	.8789	11	.9366	26	.0634	10
31 0	.7118	21	.9331	8	.7788	28	.2212	59 0	41 0	.8169	15	.8778	11	.9392	25	.0608	49 0
10	.7139	21	.9323	8	.7816	29	.2184	50	10	.8184	14	.8767	11	.9417	26	.0583	50
20	.7160	21	.9315	7	.7845	28	.2155	40	20	.8198	15	.8756	11	.9443	25	.0557	40
30	.7181	20	.9308	8	.7873	29	.2127	30	30	.8213	14	.8745	12	.9468	26	.0532	30
40	.7201	21	.9300	8	.7902	28	.2098	20	40	.8227	14	.8733	11	.9494	25	.0506	20
50	.7222	20	.9292	8	.7930	28	.2070	10	50	.8241	14	.8722	11	.9519	25	.0481	10
32 0	.7242	20	.9284	8	.7958	28	.2042	58 0	42 0	.8255	14	.8711	12	.9544	26	.0456	48 0
10	.7262	20	.9276	8	.7986	28	.2014	50	10	.8269	14	.8699	11	.9570	25	.0430	50
20	.7282	20	.9268	8	.8014	28	.1986	40	20	.8283	14	.8688	12	.9595	26	.0405	40
30	.7302	20	.9260	8	.8042	28	.1958	30	30	.8297	14	.8676	11	.9621	25	.0379	30
40	.7322	20	.9252	8	.8070	27	.1930	20	40	.8311	13	.8665	12	.9646	25	.0354	20
50	.7342	19	.9244	8	.8097	28	.1903	10	50	.8324	14	.8653	12	.9671	26	.0329	10
33 0	.7361	19	.9236	8	.8125	28	.1875	57 0	43 0	.8338	13	.8641	12	.9697	25	.0303	47 0
10	.7380	20	.9228	9	.8153	27	.1847	50	10	.8351	14	.8629	11	.9722	25	.0278	50
20	.7400	19	.9219	8	.8180	28	.1820	40	20	.8365	13	.8618	12	.9747	25	.0253	40
30	.7419	19	.9211	8	.8208	27	.1792	30	30	.8378	13	.8606	12	.9772	26	.0228	30
40	.7438	19	.9203	9	.8235	28	.1765	20	40	.8391	14	.8594	12	.9798	25	.0202	20
50	.7457	19	.9194	8	.8263	27	.1737	10	50	.8405	13	.8582	13	.9823	25	.0177	10
34 0	.7476	18	.9186	9	.8290	27	.1710	56 0	44 0	.8418	13	.8569	12	.9848	26	.0152	46 0
10	.7494	19	.9177	8	.8317	27	.1683	50	10	.8431	13	.8557	12	.9874	25	.0126	50
20	.7513	18	.9169	9	.8344	27	.1656	40	20	.8444	13	.8545	13	.9899	25	.0101	40
30	.7531	19	.9160	9	.8371	27	.1629	30	30	.8457	12	.8532	12	.9924	25	.0076	30
40	.7550	18	.9151	9	.8398	27	.1602	20	40	.8469	13	.8520	13	.9949	26	.0051	20
50	.7568	18	.9142	8	.8425	27	.1575	10	50	.8482	13	.8507	12	9.9975	25	.0025	10
35 0	9.7586	18	9.9134	9	9.8452	27	0.1548	55 0	45 0	9.8495		9.8495		0.0000		0.0000	45 0
Arc.	Cos.	Dif.	Sin	Dif	Cotan.	Dif.	Tan.	Arc.	Arc.	Cos.	Dif.	Sin.	Dif.	Cotan.	Dif.	Tan.	Arc

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DECIMALS OF AN HOUR.				QUANTITIES DEPENDING ON THE FIGURE OF THE EARTH. Compression = 0.00324.							
				ϕ	Angle of Vertical.	Diff. for 10′	log. r.	Diff. for 10′	log. Δ.	Diff. for 10′	log. B.
m.	Decimal.	s.	Decimal.	°	′ ″	″					
0				0	0 0.0	+3.88	9.9999999	− 0.8	9.9971812	+ 1.0	0.0000000
1	.01667	1	.00028	1	0 23.3	3.88	.9999996	2.2	.9971818	1.8	.0000006
2	.03333	2	.00056	2	0 46.5	3.87	.9999983	3.3	.9971829	3.7	.0000017
3	.05000	3	.00083	3	1 9.7	3.85	.9999962	4.8	.9971851	5.0	.0000039
4	.06667	4	.00111	4	1 32.9	3.83	.9999933	6.2	.9971881	6.3	.0000069
5	.08333	5	.00139	5	1 55.9	3.81	.9999896	7.7	.9971919	7.7	.0000107
6	.10000	6	.00167	6	2 18.7	3.79	.9999850	9.4	.9971965	9.2	.0000153
7	.11667	7	.00194	7	2 41.4	3.76	.9999794	10.7	.9972020	10.7	.0000208
8	.13333	8	.00222	8	3 3.9	3.71	.9999730	12.0	.9972084	12.0	.0000272
9	.15000	9	.00250	9	3 26.2	3.67	.9999658	13.3	.9972156	13.2	.0000344
10	.16667	10	.00278	10	3 48.2	3.63	.9999578	14.5	.9972235	14.7	.0000423
11	.18333	11	.00306	11	4 10.0	3.58	.9999491	15.8	.9972323	16.1	.0000511
12	.20000	12	.00333	12	4 31.5	3.52	.9999396	17.2	.9972419	17.3	.0000607
13	.21667	13	.00361	13	4 52.6	3.46	.9999293	18.3	.9972523	18.7	.0000711
14	.23333	14	.00389	14	5 13.4	3.40	.9999183	19.1	.9972635	19.8	.0000823
15	.25000	15	.00417	15	5 33.7	3.33	.9999065	21.0	.9972754	21.0	.0000942
16	.26667	16	.00444	16	5 53.8	3.26	.9998939	22.2	.9972880	22.2	.0001068
17	.28333	17	.00472	17	6 13.3	3.18	.9998806	23.3	.9973013	23.5	.0001201
18	.30000	18	.00500	18	6 32.4	3.10	.9998666	24.5	.9973154	24.7	.0001342
19	.31667	19	.00528	19	6 51.1	3.02	.9998519	25.7	.9973302	25.7	.0001490
20	.33333	20	.00556	20	7 9.2	2.94	.9998365	26.7	.9973456	26.8	.0001644
21	.35000	21	.00583	21	7 26.8	2.85	.9998205	27.7	.9973617	27.8	.0001805
22	.36667	22	.00611	22	7 43.9	2.76	.9998039	28.8	.9973784	29.0	.0001972
23	.38333	23	.00639	23	8 0.4	2.66	.9997866	29.8	.9973958	29.8	.0002146
24	.40000	24	.00667	24	8 16.4	2.56	.9997687	30.8	.9974137	31.0	.0002325
25	.41667	25	.00694	25	8 31.7	2.45	.9997502	31.7	.9974323	31.7	.0002511
26	.43333	26	.00722	26	8 46.4	2.35	.9997312	32.5	.9974513	32.7	.0002701
27	.45000	27	.00750	27	9 0.5	2.24	.9997117	33.5	.9974709	33.2	.0002897
28	.46667	28	.00778	28	9 13.9	2.13	.9996916	34.2	.9974910	34.3	.0003098
29	.48333	29	.00806	29	9 26.7	1.95	.9996711	34.8	.9975116	35.2	.0003304
30	.50000	30	.00833	30	9 38.4	1.80	.9996502	35.7	.9975327	35.8	.0003515
31	.51667	31	.00861	31	9 49.1	1.77	.9996288	36.3	.9975542	36.5	.0003730
32	.53333	32	.00889	32	10 0.8	1.65	.9996070	37.0	.9975761	37.0	.0003949
33	.55000	33	.00917	33	10 10.7	1.53	.9995848	37.5	.9975984	37.7	.0004172
34	.56667	34	.00944	34	10 19.9	1.41	.9995623	38.2	.9976210	38.2	.0004398
35	.58333	35	.00972	35	10 28.3	1.28	.9995394	38.9	.9976439	38.7	.0004627
36	.60000	36	.01000	36	10 36.0	1.15	.9995161	39.2	.9976671	39.2	.0004854
37	.61667	37	.01028	37	10 42.9	1.02	.9994926	39.5	.9976906	39.5	.0005084
38	.63333	38	.01056	38	10 49.0	0.89	.9994689	39.8	.9977143	40.0	.0005331
39	.65000	39	.01083	39	10 54.3	0.67	.9994450	40.0	.9977387	40.2	.0005571
40	.66667	40	.01111	40	10 58.4	0.70	.9994210	40.3	.9977624	40.5	.0005812
41	.68333	41	.01139	41	11 2.6	0.68	.9993968	40.7	.9977867	40.7	.0006055
42	.70000	42	.01167	42	11 5.5	0.35	.9993724	40.8	.9978111	40.8	.0006299
43	.71667	43	.01194	43	11 7.6	0.22	.9993479	41.0	.9978356	40.8	.0006544
44	.73333	44	.01222	44	11 8.7	+0.08	.9993233	41.0	.9978601	41.0	.0006789
45	.75000	45	.01250	45	11 9.4	−0.05	.9992987	41.0	.9978847	41.0	.0007035
46	.76667	46	.01278	46	11 9.1	0.19	.9992741	41.0	.9979093	41.8	.0007281
47	.78333	47	.01306	47	11 7.9	0.33	.9992495	40.8	.9979339	40.8	.0007527
48	.80000	48	.01333	48	11 5.9	0.46	.9992250	40.8	.9979584	40.8	.0007772
49	.81667	49	.01361	49	11 3.8	0.60	.9992006	40.5	.9979829	40.5	.0008017
50	.83333	50	.01389	50	10 59.6	0.73	.9991763	40.2	.9980072	40.3	.0008260
51	.85000	51	.01417	51	10 55.2	0.86	.9991522	40.0	.9980314	40.0	.0008501
52	.86667	52	.01444	52	10 50.0	1.00	.9991282	39.8	.9980554	39.5	.0008740
53	.88333	53	.01472	53	10 44.0	1.13	.9991043	39.3	.9980791	39.2	.0008979
54	.90000	54	.01500	54	10 37.2	1.26	.9990807	38.8	.9981026	38.8	.0009214
55	.91667	55	.01528	55	10 29.7	1.38	.9990574	38.5	.9981259	38.3	.0009447
56	.93333	56	.01556	56	10 21.4	1.51	.9990343	38.0	.9981489	37.8	.0009677
57	.95000	57	.01583	57	10 12.3	1.64	.9990115	37.2	.9981716	37.2	.0009904
58	.96667	58	.01611	58	10 2.5	1.76	.9989892	36.2	.9981939	36.5	.0010127
59	.98333	59	.01639	59	9 51.9	1.89	.9989675	35.7	.9982158	36.0	.0010346
60	1.00000	60	.01667	60	9 40.6	−2.02	9.9989461	−35.1	9.9982374	+35.5	0.0010562

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TABLE, SHOWING THE CORRECTION REQUIRED ON ACCOUNT OF SECOND DIFFERENCES,

In finding the Greenwich Time corresponding to a reduced Lunar Distance.

Arguments:—Approximate Interval and Difference of Proportional Logarithms.

Approximate Interval.		Difference of the Proportional Logarithms in the Ephemeris.																									
		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
h. m.	h. m.	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s
0 0	3 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 10	2 50	0	0	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
0 20	2 40	0	1	1	1	1	2	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6
0 30	2 30	0	1	1	2	2	2	2	3	3	3	4	4	5	5	5	6	6	6	7	7	7	8	8	8	9	9
0 40	2 20	0	1	1	2	2	3	3	3	4	4	5	5	6	6	6	7	7	8	8	9	9	10	10	10	11	11
0 50	2 10	1	1	2	2	3	3	4	4	5	5	5	6	6	7	7	8	8	9	9	10	10	11	12	12	13	13
1 0	2 0	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10	10	11	12	12	13	13	14	14
1 10	1 50	1	1	2	2	3	4	4	5	5	6	6	7	8	8	9	9	10	11	11	12	12	13	14	14	15	15
1 20	1 40	1	1	2	3	3	4	4	5	6	6	7	7	8	9	9	10	10	11	12	12	13	14	14	15	15	16
1 30	1 30	1	1	2	3	3	4	4	5	6	6	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	16

Approximate Interval.		Difference of the Proportional Logarithms in the Ephemeris.																									
		54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	
h. m.	h. m.	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	
0 0	3 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0 10	2 50	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	7	7	
0 20	2 40	7	7	7	7	8	8	8	8	9	9	9	9	10	10	10	10	11	11	11	11	12	12	12	12	13	
0 30	2 30	9	10	10	10	11	11	12	12	12	13	13	13	14	14	14	14	15	15	16	16	16	17	17	17	18	
0 40	2 20	12	12	13	13	13	14	14	15	15	16	16	16	17	17	18	18	19	19	19	20	20	21	21	22	22	
0 50	2 10	14	14	15	15	16	16	16	17	17	18	19	19	20	20	21	21	22	22	22	23	23	24	24	25	26	
1 0	2 0	15	16	16	17	17	18	18	19	19	20	21	21	22	22	23	23	24	24	25	25	26	27	27	28	28	
1 10	1 50	16	17	17	18	18	19	19	20	21	21	22	22	23	24	24	25	25	26	27	27	28	28	29	30	30	
1 20	1 40	17	17	18	19	19	20	20	21	21	22	23	23	24	25	25	26	26	27	28	28	29	29	30	31	31	
1 30	1 30	17	18	18	19	19	20	21	21	22	23	23	24	24	25	25	26	27	27	28	29	29	30	31	31	32	

Approximate Interval.		Difference of the Proportional Logarithms in the Ephemeris.																	
		104	106	108	110	112	114	116	118	120	122	124	126	128	130	132	134	136	138
h. m.	h. m.	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s
0 0	3 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 10	2 50	7	7	7	7	7	7	8	8	8	8	8	8	8	8	9	9	9	9
0 20	2 40	13	13	13	14	14	14	14	15	15	15	15	15	16	16	16	16	17	17
0 30	2 30	18	18	19	19	19	20	20	20	21	21	21	22	22	22	23	23	24	24
0 40	2 20	22	23	23	24	24	25	25	25	26	26	27	27	28	28	28	29	29	30
0 50	2 10	26	26	27	27	28	29	29	29	30	30	31	31	32	32	33	33	34	34
1 0	2 0	29	29	30	30	31	31	32	33	33	34	34	35	35	36	37	37	38	38
1 10	1 50	31	31	32	32	33	34	34	35	35	36	37	37	38	38	39	40	40	41
1 20	1 40	32	33	33	34	34	35	35	36	37	38	38	39	39	40	41	41	42	42
1 30	1 30	32	33	34	34	25	35	36	36	37	38	39	39	40	40	41	42	42	43

The Correction is to be *added* to the approximate Greenwich Time when the Proportional Logarithms in the Ephemeris are *decreasing*, and *subtracted* when they are *increasing*.

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TABLE OF LATITUDES

AND DISTANCES FROM WASHINGTON, OF THE PRINCI- WITH THE

N. B. The authorities for the European places may be found in the Capitals of States are

Place.	State.	Object.	Longitude from Greenwich in arc.	Longitude from Greenwich in time.	Authority for the Longitude.
			° ′ ″		
Aberdeen,	Scotland,	*Obs.*	W. 2 5 42	8 22.8	
Abo,	Finland,	*Obs.*	E. 22 17 12	1 29 8.8	
Albany,	N. Y.	*Capitol*	W. 73 42 49	4 54 51.3	Kendall.
Alexandria,	D. C.		" 77 6 45	5 8 27	Kendall.
Altona,	Denmark,	*Obs.*	E. 9 56 39	39 46.6	
Annapolis,	Md.		W. 76 33	5 6 12	
Apalachicola Bay,	Fa.	*Light*	" 85 5 15	5 40 21	Coffin.
Armagh,	Ireland,	*Obs.*	" 6 38 53	26 35.5	
Auburn,	N. Y.		" 76 28	5 5 52	
Augusta,	Ga.		" 81 54	5 27 36	
Augusta,	Me.	*State H.*	" 69 50	4 39 20	
Baker's Island,	Mass.	*Light*	" 70 47 37	4 43 10.5	Paine
Baltimore,	Md.	*St. M. Coll.*	" 76 37	5 6 28	Kendall.
Bangor,	Me.	*State H.*	" 68 47	4 35 8	
Batavia,	N. Y.		" 78 13	5 12 52	
Beaufort,	S. C.	*Arsenal*	" 80 41 23	5 22 45.6	
Bedford,	Eng.	*Obs.*	" 28 0	1 52.0	
Berlin,	Prussia,	*Obs. Old*	E. 13 23 53	53 35.5	
———		*New do.*	" 13 23 50	53 35.3	
Blackheath,	England,	*Obs.*	" 41	2.7	
Bologna,	Italy,		" 11 20 53	45 23.5	
Bonn,	Germany,	*Obs.*	" 7 6 45	28 27.0	
Boston,	Mass.	*St. House.*	W. 71 4 20	4 44 17.3	Walker.
Bremen,	Germany,	*Obs.*	E. 8 48 59	35 15.9	
Breslaw,	Germany,	*Obs.*	" 17 2 30	1 8 10.	
Brooklyn,	N. Y.	*Navy Yd.*	W. 74 0 3	4 56 0.2	Walker.
Brunswick,	Me.	*College*	" 69 55	4 39 40	
Brussels,	Belgium,	*Obs.*	E. 4 22 8	17 28.5	
Buda,	Hungary,	*Obs.*	" 19 3 11	1 16 12.7	
Buffalo,	N. Y.		W. 78 55	5 15 40	
Burlington,	N. J.	*Obs.*	" 74 52 6	4 59 28.4	Kendall.
Burlington,	Vt.		" 73 10	4 52 40	
Bushy Heath,	England,	*Obs.*	" 20 14	1 20.9	
Calais,	Me.		" 67 12 15	4 28 49	Downes.
Cambridge,	Mass. Old,	*Obs.*	" 71 7 21	4 44 29.4	
Cambridge,	England,	*Obs.*	E. 5 51	23.5	
Camden,	S. C.		W. 80 33	5 22 12	
Canandaigua,	N. Y.		" 77 17	5 9 8	
Cape Ann,	Mass.	*N. Light*	" 70 34 44	4 42 18.9	Paine.
———,	do.	*S. Light*		———	Paine.
Cape Elizabeth,	Me.	*Light*	" 70 11 6	4 40 44.4	Boutelle.
Cape Cod,	do.	*Light*	" 70 4 9	4 40 16.6	Paine.
Cape Horn,	S. America,		" 67 16 8	4 29 4.5	Fitzroy.
Cape of Good Hope,	Africa,	*Obs.*	E. 18 28 45	1 13 55	
Castine,	Me.	*Fort*	W. 68 59 33	4 35 58.2	Boutelle.
Charleston,	S. C.	*St. M. Ch.*	" 79 57 27	5 19 49.8	
Charlestown,	Mass.	*Navy Yd.*	" 71 3 33	4 44 14.2	
Charlottesville,	Va.	*Univ. Obs.*	" 78 31 30	5 14 6	Paine.
Chicago,	Ill.		" 87 30 30	5 50 2	
Christiania,	Sweden,	*Obs.*	E. 10 44 57	42 59.8	
Cincinnati,	Ohio,	*Obs.*	W. 84 24	5 37 36	De Ferrer.
Columbia,	S. C.		" 81 7	5 24 28	
Columbus,	Ohio,		" 83 3	5 32 12	
Concord,	N. H.	*St. House.*	" 71 29	4 45 56	

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AND LONGITUDES,

PAL CITIES, OBSERVATORIES, NAVAL STATIONS, &c.;

AUTHORITIES.

Connaissance des Temps, Nautical Almanac, or Berliner Jahrbuch. printed in Italics.

Names of Places.	Distance from Wash'ton in miles.	Latitude.	Authority for the Latitude.
		° ′ ″	
Aberdeen,		57 8 57.8	
Abo,		60 26 56.8	
Albany,	370	42 39 3	Paine.
Alexandria,	7	38 49	Hallowell.
Altona,		53 32 45.3	
Annapolis,	40	38 58 35	
Apalachicola Bay,	863	29 37 25	Coffin
Armagh,		54 21 12.7	
Auburn,	333	42 55	
Augusta,	575	33 28	
Augusta,	595	44 18 43	Paine.
Baker's Island,	452	42 32 11	Paine.
Baltimore,	40	39 17 55	Nicollet
Bangor,	663	44 47 50	Paine.
Batavia,	374	42 59	
Beaufort,	635	32 25 57	Paine.
Bedford,		52 8 27.6	
Berlin,		52 31 12.5	
——,		52 30 16	
Blackheath,		51 28 2	
Bologna,		44 29 54	
Bonn,		50 44 9.1	
Boston,	440	42 21 23	Paine.
Bremen,		53 4 36	
Breslaw,		51 6 30	
Brooklyn,	226	40 42 0	Blunt.
Brunswick,	570	43 53	
Brussels,		50 51 10.8	
Buda,		47 29 12.2	
Buffalo,	381	42 53	
Burlington,	156	40 4 52	Gummere.
Burlington,	513	44 27	
Bushy Heath,		51 37 44.3	
Calais,	786	45 11 18	Downes.
Cambridge,	437	42 22 15.	
Cambridge,		52 12 51.8	
Camden,	473	34 17	
Canandaigua,	341	42 54	
Cape Ann,	470	42 38 18	Paine.
——,	—	42 38 10	Paine.
Cape Elizabeth,		43 33 6	Boutelle.
Cape Cod,	507	42 2 22	Paine.
Cape Horn,		S. 55 58 40	Fitzroy.
Cape of Good Hope,		S. 33 56 3	
Castine,	671	44 22 45	Boutelle.
Charleston,	540	32 46 33	Paine.
Charlestown,	441	42 22	
Charlottesville,	121	38 2 3	Patterson.
Chicago,	717	42 0	
Christiania,		59 54 42.4	
Cincinnati,	492	39 5 54.	De Ferrer.
Columbia,	506	33 57	
Columbus,	393	39 57	
Concord,	481	43 12 29	Paine.

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LATITUDES AND LONGITUDES.

Place.	State.	Object.	Longitude from Greenwich in arc.	Longitude from Greenwich in time.	Authority for the Longitude.
			° ′ ″		
Constantinople,	Turkey,	*M. St. Soph.*	W. 28 59	1 55 56	
Copenhagen,	Denmark,	*Obs.*	E. 12 34 57	50 19.8	
Coteau des Prairies,	Iowa,	*Red Quarry.*	W. 94 19 15	6 25 17.	Walker.
Coteau du Missouri,	Iowa,		" 90 15 15	6 1 1.	Walker.
Cracow,	Poland,	*Obs.*	" 19 57 47	1 19 51.1	
Dayton,	Ohio,		W. 84 11	5 36 44	
Detroit,	Mich.		" 82 58	5 31 52	
Dorchester,	Mass.	*Obs.*	" 71 4 30	4 44 18.6	Walker.
Dorpat,	Russia,	*Obs.*	E. 26 43 45	1 46 55.	
Dover,	N. H.		W. 70 54	4 43 36	
Dover,	Del.		" 75 30	5 2 0	
Dover,	Ohio,		" 81 29	5 25 56	Blickensderfer.
Dublin,	Ireland,	*Obs.*	" 6 20 30	25 22	
Durham,	Scotland,	*Obs.*	" 1 34 30	6 18	
Eastport,	Me.		" 66 56	4 27 44	
Edenton,	N. C.		" 76 40	5 6 40	
Edinburgh,	Scotland,	*Obs.*	" 3 10 54	12 43.6	
Florence,	Italy,		E. 11 15 54	45 3.6	
Frankfort,	Ky.		W. 84 40	5 38 40	
Fredericksburg,	Va.		" 77 38	5 10 32	
Fredericton,	N. B.		" 66 45	4 27 0	
Frederick,	Md.		" 77 18	5 9 12	
Galveston,	Texas.		" 94 47 15	6 19 9	Semmes.
Germantown,	Pa.	*Obs.*	" 75 10 9	5 0 40.6	Walker.
Geneva,	Switzerland,	*Obs.*	E. 6 9 22	24 37.5	
Georgetown,	D. C.	*Obs.*	W. 77 5 15	5 8 21	Bowditch.
Georgetown,	S. C.		" 79 17	5 17 8	
Gloucester,	Mass.	*Univ. Ch.*	" 70 40 19	4 42 41.3	Paine.
———,	do.	*T. P. Isl. do.*	" 70 40 16	4 42 41.1	Paine.
Gotha,	Germany,		E. 10 44 6	42 56.4	
Gottingen,	Hanover,	*Obs.*	" 9 56 38	39 46.5	
Greenwich,	England,	*Obs.*	0	0.	
Halifax,	N. S.		W. 63 36 40	4 14 26.7	Paine.
Hallowell,	Me.		" 69 52 30	4 39 30	
Hamburg,	Germany,	*Obs.*	E. 9 58 32	39 54.1	
Harrisburg,	Pa.		W. 76 50	5 7 20	
Hartford,	Conn.	*St. House*	" 72 40 45	4 50 43	Paine.
Havana,	W. I.	*M. Castle.*	" 82 22 21	5 29 29.4	De Ferrer.
Haverford,	Pa.	*School.*	" 75 18 36	5 1 14.4	Kendall.
Helsingfors,	Finnland,	*Obs.*	E. 24 57 53	1 39 51.5	
Hudson,	N. Y.		W. 73 46	4 55 4.	
Hudson,	Ohio,	*Obs.*	" 81 24 54	5 25 39.6	Loomis.
Huntsville,	Ala.		" 86 57	5 47 48.	
Indianapolis,	Ind.		" 86 5	5 44 20	
Jackson,	Mi.		" 90 8	6 0 32	
Jefferson,	Mo.		" 92 8	6 8 32	
Kasan,	Russia,	*Obs.*	E. 49 6 38	3 16 26.5	
Kensington,	England,	*Obs.*	W. 11 43	46.8	
Key West,		*Light.*	" 81 48 30	5 27 14	Coffin.
Kingston,	U. C.		" 76 40	5 6 40	
Knoxville,	Tenn.		" 83 54	5 35 36	
Konigsberg,	East Prussia,	*Obs.*	E. 20 30 8	1 22 0 5	
Kremsmunster,	Germany,	*Obs.*	" 14 8 9	56 32.6	
Lancaster,	Pa.		W. 76 20 33	5 5 22.2	Ellicott.
Lexington,	Ky.		" 84 18	5 37 12	
Leyden,	Holland,	*Obs.*	E. 4 31 53	18 7.5	
Little Rock,	Ark.		W. 92 12	6 8 48.	
Louisville,	Ky.		" 85 30	5 42 0	
London,	England,	*St. Paul's*	" 5 45	0 23	
Lowell,	Mass.	*St. Ann's C.*	" 71 18 57	4 45 15.8	
Madras,	India,	*Obs.*	E. 80 15 57	5 21 3.8	
Manheim,	Germany,	*Obs.*	" 8 27 51	33 51.4	
Marblehead,	Mass.	*Light.*	W. 70 50 39	4 43 22.6	
Marseilles,	France,	*Obs.*	" 5 22 15	21 29.0	
Matinicus Rock,	Me.	*Light.*	" 68 57 1	4 35 48	Boutelle.
Mexico,	Mexico,		" 99 5	6 36 20	Humboldt.
Middletown,	Conn.	*W. Univ.*	" 72 39	4 50 36	

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LATITUDES AND LONGITUDES.

Names of Places.	Distance from Wash'ton in miles.	Latitude.	Authority for the Latitude.
		° ′ ″	
Constantinople,		41 0 16	
Copenhagen,		55 40 53	
Coteau des Prairies,		44 0 52	Nicollet
Coteau du Missouri,		38 37 28	Nicollet.
Cracow,		50 3 50	
Dayton,	461	39 44	
Detroit,	524	42 24	
Dorchester,	438	42 19 10.	Paine.
Dorpat,		58 22 47.1	
Dover,	490	43 13	
Dover,	120	39 10	
Dover,	372	40 30 52	Blickensderfer.
Dublin,		53 23 13	
Durham,		54 46 14.9	
Eastport,	769	44 54	
Edenton,	274	36 5	
Edinburgh,		55 57 23.2	
Florence,		43 46 40.8	
Frankfort	542	38 14	
Fredericksburg,	56	38 34	
Fredericton,		46 3	
Frederick,	43	39 24	
Galveston,		29 15	
Germantown,	144	40 2 40	De Ferrer.
Geneva,		46 11 59.4	
Georgetown,	2	38 55	
Georgetown,	488	33 21	
Gloucester,	462	42 36 44	Paine:
———,	463	42 36 4	Paine.
Gotha,		50 56 5.2	
Gottingen,		51 31 47.9	
Greenwich,		51 28 39	
Halifax,	936	44 39 20	
Hallowell,	593	44 17	
Hamburg,		53 33 5	
Harrisburg,	110	40 16	
Hartford,	335	41 45 59	Paine.
Havana,		23 9 26	De Ferrer.
Haverford,	130	40 1 12	Gummere.
Helsingfors,		60 9 42.3	
Hudson,	341	42 14	
Hudson,	335	41 14 42.6	Loomis.
Huntsville,	708	34 36	
Indianapolis,	571	39 55	
Jackson,	1010	32 23	
Jefferson,	936	38 36	
Kasan,		55 47 30	
Kensington,		51 30 12.7	
Key West,		24 32 32	Coffin.
Kingston,	456	44 8	
Knoxville,	498	35 59	
Konigsberg,		54 42 50.4	
Kremsmunster,		48 3 24.	
Lancaster,	111	40 2 36	Ellicott.
Lexington,	522	38 6	
Leyden,		52 9 28.2	
Little Rock,	1065	34 40	
Louisville,	596	38 3	
London,		50 30 49	
Lowell,	444	42 38 48	
Madras,		13 4 9.2	
Manheim,		49 29 13.7	
Marblehead,	458	42 30 14	
Marseilles,		43 17 49	
Matinicus Rock,		43 46 42	Boutelle.
Mexico,		19 25 45	
Middletown,	396	41 33 8	Smith.

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LATITUDES AND LONGITUDES.

Place.	State.	Object.	Longitude from Greenwich in arc.				Longitude from Greenwich in time.			Authority for the Longitude.
				°	′	″				
Milledgeville,	Ga.		W.	83	20		5	33	20	Nicollet.
Milan,	Italy,	*Obs.*	E.	9	11	48		36	47.2	
Mobile,	Ala		W.	88.	11		5	52	44.	
Mobile Point,		*Light.*	"	88	0	36	5	52	2.4	Coffin,
Modena,		*Obs.*	E.	10	55	48		43	43.2	
Monhegan Island,	Me.		W.	69	18	5	4	37	12.3	Boutelle.
Monomy,	Mass.	*Pt. Light.*	"	70	0	6	4	40	0.4	Paine.
Montpelier,	Vt.		"	72	36		4	50	24.	
Montreal,	L. C.		"	73	35		4	54	20.	
Munich,	Bavaria,	*Obs.*	E.	11	36	38		46	26.5	
Naples,	Italy,	*Obs.*	"	14	15	5		57	0.3	
Nashville,	Tenn.	*Univ.*	W.	86	49	3	5	47	16.2	Paine.
Natchez	M'pi.	*Castle.*	"	91	24	42	6	5	38.8	Bowditch.
Newark,	N. J.		"	74	10		4	56	40.	
New Bedford,	Mass.		"	70	55	49	4	43	43.3	Paine.
Newbern,	N. C.		"	77	5		5	8	20.	
Newburg,	N. Y.		"	74	1		4	56	4	
Newburyport,	Mass.	*Light.*	"	70	49	30	4	43	18.0	Paine.
Newcastle,	Del.		"	75	32		5	2	8.	
New Haven,	Conn.	*Obs.*	"	72	57	30	4	51	50	Walker.
New London,	Conn.		"	72	9		4	48	36	
New Orleans,	La.	*N. E Light*	"	89	1	50	5	56	7.3	Talcott.
———,	do.	*S. W. Light.*	"	89	21	53	5	57	27.5	Talcott.
Newport,	R. I.	*Ct. House.*	"	71	21	14	4	45	24.9	
Newport,	Mo.		"	91	7	15	6	4	29	Kendall.
New York,	N. Y.	*City Hall.*	"	74	1	6	4	56	4.4	Walker.
Nicolaeff,	Russia,	*Obs*	E.	31	58	47	2	7	55.1	
Norfolk,	Va	*F. Bank.*	W.	76	18	47	5	5	15.1	Paine.
Northampton,	Mass.	*1st C. Ch.*	"	72	38	21	4	50	33.4	Paine.
Norwich,	Conn.		"	72	7		4	48	28	
Ormskirk,	England,	*Obs.*	"	2	54			11	36	
Oxford,	England,	*Obs.*	"	1	15	23		5	1.5	
Padua,	Italy,	*Obs.*	E.	11	52	18		47	27.2	
Palermo,	Italy,	*Old Obs.*	"	13	21	24		53	25.6	
Paramatta,	N. S. Wales,	*Obs.*	"	151	1	35	10	4	6 3	
Paris,	France,	*Obs.*	"	2	20	22		9	21.5	
Pensacola,	Fa.	*Navy Yd.*	W.	87	15	21	5	49	1.4	Coffin.
———,	do.	*Light.*	"	87	17	0	5	49	8.0	"
Petersburg,	Russia,	*Pulkova Obs.*	E.	30	19	46	2	1	19.1	
Petersburg,	Va.		W.	77	20		5	9	20	
Philadelphia,	Pa	*St. House.*	"	75	9	45	5	0	39.	Walker.
———,	do.	*H. S. Obs.*	"	75	10	20	5	0	41.9	Walker.
Pittsburg,	Pa.		"	79	58		5	19	52	De Ferrer.
Plymouth,	Mass.	*Ct. House.*	"	70	40	28	4	42	41.9	Paine.
Portland,	Me.	*Tn. House.*	"	70	20	30	4	41	22	
Portsmouth,	N. H.	*U. Church.*	"	70	45	50	4	43	3.3	Paine.
Prague,	Bohemia,	*Obs.*	E	14	25	29		57	41 9	
Princeton,	N. J.	*Nassau Hall.*	W.	74	39	33	4	58	38.2	Walker.
Providence,	R. I.	*Univ. Hall.*	"	71	24	48	4	45	39.2	Paine.
Quebec,	L. C	*Citadel.*	"	71	16		4	45	4	Bayfield,
Raleigh,	N. C.		"	78	48		5	15	12	
Regent's Park,	London,	*Obs.*	"		9	17			37.1	
Richmond,	Va.	*Capitol.*	"	77	27	28	5	9	49.9	Paine.
Rochester,	N. Y.	*R'r House.*	"	77	51		5	11	24	
Rome,	Italy,	*Obs.*	E.	12	28	41		49	54.7	
Roscoe,	Ohio,		W.	81	52		5	27	28	Blickensderfer.
Sackett's Harbour,	N. Y.		"	75	57		5	3	48	
St. Augustine,	Fa.		"	81	35		5	26	20	
St. Croix,	W. I.	*Obs.*	"	64	41	15	4	18	45	Wurm.
St. Fernando,	Spain,	*Obs.*	"	6	12	17		24	49.1	
St. Helena,	Africa,	*Obs.*	"	5	42	30		22	50.	
St. Joseph's Bay,	Fa.	*Light.*	"	85	23	15	5	41	33	Coffin.
St. Louis,	Mo.	*Cathedral.*	"	90	15	10	6	1	0.7	Walker.
St. Mark's,	Fa.		"	84	11	0	5	36	44	Semmes.
Salem,	Mass.	*E. I. M. Hall.*	"	70	53	57	4	43	35.8	Paine,
Savannah,	Ga.	*Exchange.*	"	81	7	9	5	24	28.6	Paine.
Schenectady,	N. Y.		"	73	55		4	55	40.	

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LATITUDES AND LONGITUDES.

Names of Places.	Distance from Wash'ton in miles.	Latitude.	Authority for the Latitude.
		° ′ ″	
Milledgeville,	648	33 4 30	Nicollet.
Milan,		45 28 0.7	
Mobile,	1013	30 40	
Mobile Point,		30 13 38	Coffin.
Modena,		44 38 52.8	
Monhegan,		43 45 52	Boutelle.
Monomy,	506	41 33 31	Paine.
Montpelier,	516	44 17	
Montreal,	601	45 31	
Munich,		48 8 45	
Naples,		40 51 46.6	
Nashville,	684	36 9 33	
Natchez,	1110	31 33 48	
Newark,	215	40 45	
New Bedford,	434	41 38 7	Paine.
Newbern,	348	35 20	
Newburg,	286	41 31	
Newburyport,	478	42 48 23	Paine.
Newcastle,	15	39 40	
New Haven,	300	41 18 30	
New London,	353	41 22	
New Orleans,	1172	29 8 32	Talcott.
———,		28 58 30	Talcott.
Newport,	408	41 28 20	Paine.
Newport,		38 33 58	Nicollet.
New York,	225	40 42 35	
Nicolaeff,		46 58 20.6	
Norfolk,	230	36 50 50.	Paine.
Northampton,	380	42 19 8	Paine.
Norwich,	357	41 33	
Ormskirk,		53 34 18	
Oxford,		51 45 40	
Padua,		45 24 2.5	
Palermo,		38 6 44	
Paramatta,		S. 33 48 49.8	
Paris,		48 50 13.	
Pensacola,		30 20 30	Coffin.
———,		30 20 48	Coffin.
Petersburg,		59 46 18.7	
Petersburg,	140	37 13 54	
Philadelphia,	138	39 56 58	
———,	135	39 57 8	
Pittsburg,	226	40 26 15	De Ferrer.
Plymouth,	447	41 57 28	Paine.
Portland,	575	43 39 26	Paine.
Portsmouth,	493	43 4 35	
Prague,		50 5 18.5	
Princeton,	177	40 20 41	Alexander
Providence,	400	41 49 32	Paine.
Quebec,	781	46 49 12	Bayfield.
Raleigh,	288	35 47	
Regent's Park,		51 31 30	
Richmond,	117	37 32 17	Paine.
Rochester,	369	43 8 17	Paine.
Rome,		41 53 54	
Roscoe,	338	40 16 40	Blickensderfer.
Sackett's Harbour,	415	43 55	
St. Augustine,	821	29 48 30	
St. Croix,		17 44 32	Lang.
St. Fernando,		36 27 43	
St. Helena,		S. 15 55 26	
St. Joseph's Bay,	808	29 52	Coffin.
St. Louis,	454	38 37 28	Nicollet.
St. Mark's,	662	30 2	Semmes.
Salem,	384	42 31 19	Paine.
Savannah,		32 4 56	Paine.
Schenectady,		42 48	

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LATITUDES AND LONGITUDES.

Place.	State.	Object.	Longitude from Greenwich in arc.			Longitude from Greenwich in time.			Authority for the Longitude.
			°	′	″				
Slough,	England,	*Obs.*	W.		36		0	2 24	
South Bend,	Lake Michigan,		"	87	19	39	5 49	18.6	Walker.
Southwick,	Mass.	*Obs.*	"	72	48	57	4 51	15.8	Walker.
Speyer,	Germany,	*Obs.*	E.	8	26	38		33	46.5
Springfield,	Mass.	*Ct. House.*	W.	72	35	47	4 50	23.2	Paine.
Springfield,	Ill.		"	89	33	12	5 58	12.8	
Stockholm,	Sweden,	*Obs.*	E.	18	3	30	1 12	14	
Tallahasse,	Fa.		W.	84	36		5 38	24	
Tampa Bay,	Fa.	*Egmont Key.*	"	82	45	15	5 31	1	Coffin,
Ti Tanka Taminan Lake,	Ioway,		"	93	20	54	6 13	23	Kendall.
Taunton,	Mass.		"	71	6	5	4 44	24.3	Paine.
Toronto,	U. C.		"	79	20		5 17	20	
Tortugas,	Fa.	*Light.*	"	82	52	22	5 31	29.5	Coffin.
Trenton,	N. J.		"	74	39		4 58	36	
Troy,	N. Y.		"	73	40		4 54	40	
Turin,	Italy,		E.	7	42	6		30	48.4
Turtle Island,	Lake Erie,		W.	83	23	35	5 33	34.3	Walker.
Tuscaloosa,	Ala.	*Obs.*	"	87	42		5 50	48.	
Upsala,	Sweden,	*Obs.*	E.	17	38	42	1 10	34.8	
Utica,	N. Y.	*Dutch Ch.*	W.	75	13		5 0	52.	
Utrecht,	Holland,	*Obs.*	E.	5	7	23		20	29.5
Vandalia,	Ill.		W.	89	2		5 56	8	
Vera Cruz,	Mexico,		"	96	8	30	6 24	34.	Oltman.
Vevay,	Ind.		"	84	59		5 39	56	
Vienna,	Austria	*Obs.*	E.	16	22	59	1 5	31.9	
Vincennes,	Ind.		"	87	25		5 49	40.	
WASHINGTON,	D. C.	*Capitol*	"	77	1	30	5 8	6.0	Walker.
———,	do.	*Old Obs.*	"	77	1	32	5 8	6.1	Walker.
———,	do.	*New Obs.*	"	77			5 8		
Washington,	M'pi.		"	91	20		6 5	20	
Warsaw,	Poland	*Obs.*	E.	20	58	23	1 23	53.5	
Weasel Mountain,	N. J.	*C. S. St.*	W.	74	12	15	4 56	49	Kendall.
West Hills,	N. Y.	*C. S. St.*	"	73	25	17	4 52	41.1	Walker.
West Quoddy Head,	Me.	*Light.*	"	66	57	19	4 27	49.3	Boutelle.
Williamstown,	Mass.	*C. Church.*	"	73	13	20	4 52	53.3	Paine.
Wilmington,	Del.		"	75	28		5 1	52	
Wilmington,	N. C.		"	78	10		5 12	40.	
Wilna,	Poland	*Obs.*	E.	25	17	59	1 41	11.9	
Worcester,	Mass.	*Antiq. H.*	W.	71	48	10	4 47	12.7	Paine.
York,	Me.		"	70	40		4 42	40.	
York,	Pa.		"	76	40		5 6	40	

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LATITUDES AND LONGITUDES.

Place.	State.	Object.	Distance from Wash'ton in miles.	Latitude			Authority for the Latitude.
				°	'		
Slough,				51	29	20	
South Bend,				41	37	6	Talcott.
Southwick,			339	42	0	47	Borden.
Speyer,				49	18	55.2	
Springfield,			362	42	6	1	Paine.
Springfield,			780	39	48		
Stockholm,				59	20	31	
Tallahasse,			896	30	28		
Tampa Bay,				27	36	4	Coffin.
Ti Tanka Taminan Lake,				44	16	41	Nicollet.
Taunton,			429	41	54	8	Paine.
Toronto,			500	43	33		
Tortugas,				24	37	20	Coffin,
Trenton,			166	40	14		
Troy,			376	42	44		
Turin,				45	4	6	
Turtle Island,				41	45	9	Talcott.
Tuscaloosa,			818	33	12		
Upsala,				59	51	50	
Utica,			383	43	6	49	Paine.
Utrecht,				52	5	11	
Vandalia,			781	38	50		
Vera Cruz,				19	11	22	Ojuman.
Vevay,			544	38	46		
Vienna,				48	12	35.5	
Vincennes,			688	38	42		
WASHINGTON,			.0	38	53	23	Paine.
———,				38	53	31	Paine.
———,				38	53		
Washingtn,			1104	31	36		
Warsaw,				52	13	1	
Weasel Mountain,				40	52	35	Hassler.
West Hills,			260	40	48	49	Ferguson.
West Quoddy Head,				44	49	4	Boutelle.
Williamstown,			396	42	42	51	Paine.
Wilmington,			110	39	41		
Wilmington,			365	34	11		
Wilna,				54	41	0	
Worcester			398	42	16	13	Paine.
York,			502	43	10		
York,			90	39	56		

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TIDE TABLE.

The times given in this table are to be added to or subtracted from the time of High Water at Philadelphia.

Names of Places		h. m.	Height. Feet.
Albany, N. Y.	add	1 15	
Andrews, St., N. B.	sub.	3 0	25.0
Annapolis, Md.	sub.	7 10	
Annapolis, N. S.	sub.	3 30	30.0
Augustine, St., Fa.	sub.	7 0	5.0
Basin of Menas, Bay of Fundy			60.0
Beaver Harbour	sub.	5 40	7.0
Block Island	sub.	6 50	6.0
Boston, Ms.	sub.	3 0	11.3
Bristed Bay	sub.	6 45	8.0
Broad Bay	sub.	3 45	9.0
Buzzard's Bay	sub.	6 50	5.0
Calais, (R. St. Croix,) Me.	sub.	3 23	24.8
Cape Ann	sub.	2 55	11.0
Cape Blomidon, Bay of Fundy			60.0
Cape Canso	sub.	5 55	
Cape Charles, Va.	sub.	6 40	
Cape Chat	sub.	2 30	13.0
Cape Churchill	sub.	7 10	.0
Cape Cod Harbour, Ms.	sub.	3 0	12.9
Cape Fear, N. C.	sub.	6 30	
Cape Hatteras, N. C.	sub	5 30	5.0
Cape Henlopen, Del.	sub.	5 45	5.0
Cape Henry, Va.	add	5 10	5.0
Cape Lookout, N. C.	sub.	5 30	9.0
Cape May, N. J.	sub.	3 50	6.0
Cape Romain, S. C.	sub.	5 35	
Cape Sable, N. S	add	5 30	8.0
Cape St. Mary, N. S.	sub.	5 35	
Cape Split, Bay of Fundy	sub.	3 20	50.0
Casco Bay	sub.	3 50	9.0
Charleston, S. C.	add	5 3	7.0
Chebucto Bay	sub.	4 0	
Chignecto Bay, Bay of Fundy, N. S.			55.0
Cumberland Basin, (Head of Bay of Fundy) N. S.			70.0
Delaware River, (Mouth)	sub.	5 30	5.0
Devil's Head, (River St. Croix) Maine	sub.	5 10	25.2
Digby, N. S.			28.0
Eastport, Me.	sub.	3 10	25.0
Elizabethtown Point	sub.	5 40	5.0
Florida Keys	sub.	5 50	5.0
Fort St. John, Newfoundland	sub.	5 40	
Fryingpan Shoals	add	4 10	
Gay Head, (Martha's Vineyard) Ms.	add	5 10	5.0
George's River	sub.	3 45	9.0
Georgetown Bar	add	4 30	4.0
Gloucester	sub.	2 30	10.0
Gouldsborough	sub.	3 30	12.0
Gut of Annapolis, (Bay of Fundy) N. S.	sub.	4 30	28.0
Gut of Canso, Gulf of St. Lawrence	add	5 30	8.0
Halifax, N. S.	add	4 50	8.0
Hampton Roads	add	5 30	5.0
Hillsborough	add	5 10	5.0
Holmes' Hole, (Martha's Vineyard) Ms.	sub.	4 15	4.0
Ice Cove, Hudson's Bay	sub.	4 25	
Isles of Shoals	sub.	3 30	

Names of Places.		h. m.	Height. Feet.
Kennebec, New Hampshire	sub.	3 40	9.0
Kennebunk Port, N. H.	sub.	3 10	9.0
Louisburg, N. S.	add	4 50	5.0
Machias, Maine	sub.	3 25	11.5
Mahone Bay, Gulf of St. Lawrence	add	5 30	8.0
Marblehead, Ms.	sub.	3 30	11.0
Martha's Vineyard (W. end).	add	5 10	5.0
Minjan Harbour, Gulf of St. Lawrence	sub.	5 30	10.0
Monomoy Point, Ms.	sub.	3 0	6.0
Moose Island, Me.	sub	3 0	
Moose River, Bay of Fundy.			28.0
Mount Desert, Maine	sub.	3 35	13.0
Mouths of the Mississippi			1.5
Nantucket, Ms.	sub.	3 30	5.0
Nantucket Shoal, Ms.	sub.	3 45	5.0
Nassau, New Providence	add	5 0	7.0
New Bedford, Ms.	add	5 25	5.0
Newburyport, Ms.	sub.	3 29	5.0
New Haven, Ct.	sub.	3 15	8.0
New London, Ct.	sub.	5 40	
Newport, Rhode Island	add	5 10	5.0
New York	sub.	5 20	5.0
Norfolk, Virginia	sub.	6 0	5.0
Ocracock Inlet, N. Carolina	sub.	5 35	
Old Point Comfort, N. J.	add	3 40	
Passamaquoddy River, Maine	sub.	3 0	24.0
Penobscot River, Maine	sub.	5 20	11.0
Pictou, Nova Scotia	add	4 35	8.0
Pistolet Bay	add	4 20	
Placentia Harbour, N. F.	sub.	5 25	8.0
Plymouth, Ms.	sub.	3 0	11.0
Port Campbell	sub.	5 25	
Port Hood, Cape Breton	add	5 0	7.0
Port Jackson, Nova Scotia	add	5 35	8.0
Portland, Maine	sub.	3 40	10.0
Port Roseway, N. S.	add	5 50	8.0
Portsmouth, N. H.	sub.	3 10	11.0
Prince Edward's Isles, Gulf of St. Lawrence			5.0
Providence, Rhode Island	sub.	6 0	5.0
Quebec, Lower Canada	add	3 30	
Race Point	sub.	3 10	
Richmond, Virginia	add	4 40	4.5
Sable Island	sub.	5 0	7.0
Salem, Massachusetts	sub.	3 0	11.0
Sandwich Bay, N. S.	sub.	5 30	8.0
Sandy Hook, N. Jersey	add	4 20	5.0
Savannah, Georgia	add	5 45	
Seal Islands, Bay of Fundy	sub.	5 40	
Seven Isles Harbour, B. Fundy	sub.	3 25	30.0
St. John's, N. Brunswick	sub.	2 30	26.0
St. John's, Newfoundland	add	4 0	6.0
St. Mary's Bar	add	5 0	
St. Salvador	add	1 20	
St. Simond's Bar	add	5 0	
St. Simond's Offing	add	5 10	
St. Simond's Sound	sub.	5 25	
Sunbury	sub.	5 0	
Tarpaulin Cove	sub.	5 40	
Vineyard Sound, Ms.	sub.	3 25	5.0
Windsor, Bay of Fundy	sub.	2 30	55.0

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THE RULE OF THE *SIGNS* IN THE ALGEBRAIC EXPRESSIONS OF THE CIRCULAR FUNCTIONS.

	0°	For an angle a between 0° and 90°	90°	For an angle a between 90° and 180°	180°	For an angle a between 180° and 270°	270°	For an angle a between 270° and 360°	360°
Sine a	0	$+\sin a$	$+1$	$+\sin(180°-a)$ $+\cos(a-90°)$	0	$-\sin(a-180°)$ $-\cos(270°-a)$	-1	$-\sin(360°-a)$ $-\cos(a-270°)$	0
Cos a	$+1$	$+\cos a$	0	$-\cos(180°-a)$ $-\sin(a-90°)$	-1	$-\cos(a-180°)$ $-\sin(270°-a)$	0	$+\cos(360°-a)$ $+\sin(a-270°)$	$+1$
Tan a	0	$+\tan a$	∞	$-\tan(180°-a)$ $-\cot(a-90°)$	0	$+\tan(a-180°)$ $+\cot(270°-a)$	∞	$-\tan(360°-a)$ $-\cot(a-270°)$	0
Cot a	∞	$+\cot a$	0	$-\cot(180°-a)$ $-\tan(a-90°)$	∞	$+\cot(a-180°)$ $+\tan(270°-a)$	0	$-\cot(360°-a)$ $-\tan(a-270°)$	∞
Sec a	$+1$	$+\sec a$	∞	$-\sec(180°-a)$ $-\mathrm{cosec}(a-90°)$	-1	$-\sec(a-180°)$ $-\mathrm{cosec}(270°-a)$	∞	$+\sec(360°-a)$ $+\mathrm{cosec}(a-270°)$	$+1$
Co-Sec a	∞	$+\mathrm{cosec}\, a$	$+1$	$+\mathrm{cosec}(180°-a)$ $+\sec(a-90°)$	∞	$-\mathrm{cosec}(a-180°)$ $-\sec(270°-a)$	-1	$-\mathrm{cosec}(360°-a)$ $-\sec(a-270°)$	∞
Ver-sin a	0	$+\mathrm{versin}\, a$	$+1$	$2-\mathrm{versin}(180°-a)$ $2-\mathrm{coversin}(a-90°)$	$+2$	$2-\mathrm{versin}(a-180°)$ $2-\mathrm{coversin}(270°-a)$	$+1$	$+\mathrm{versin}(360°-a)$ $+\mathrm{coversin}(a-270°)$	0
Co-Versin a	$+1$	$+\mathrm{coversin}\, a$	0	$+\mathrm{coversin}(180°-a)$ $+\mathrm{versin}(a-90°)$	$+1$	$2-\mathrm{versin}(270°-a)$ $2-\mathrm{coversin}(a-180°)$	$+2$	$2-\mathrm{coversin}(a-270°)$ $2-\mathrm{versin}(360°-a)$	$+1$

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EXPLANATION OF THE TABLES.

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EXPLANATION OF THE ARTICLES

Contained in the Calendar, the Solar and Lunar Ephemerides, &c., for the year 1844.

Mean Time of Sun-rise and Sun-set for upper limb. The Times of the Sun's rising and setting, given in these columns, have been corrected for a Mean Horizontal Refraction of 36° 6″.86.

Greenwich Sidereal Noon. This column gives the Greenwich Mean Solar Time when the *true* point of intersection of the Ecliptic and the Equator (called the First Point of Aries), is on the Meridian of Greenwich. It is the Time which ought to be shown by a *mean*-time clock, adjusted to the Greenwich Meridian, at the moment that a clock, adjusted to Greenwich *Sidereal Time*, indicates exactly 0h. 0m. 0s. The use of the column is to facilitate the reduction of *Sidereal* to *Mean Solar Time*, as will be shown by the Explanation of the Tables. Removed from the calendar to p. 67.

Length and Increase of Days. The *length of the day* is here considered as the interval that elapses from the rising to the setting of the Sun's upper limb. The *increase* shows how much the length of the day exceeds that of the shortest day of winter; and the *decrease* how much it falls short of that of the longest day of summer.

Sun's Semidiameter. With this column the altitude of the Sun's centre may be found from an observed altitude of either the upper or lower limb. *Subtract for upper limb; add for lower limb.* Removed to the Solar Ephemeris.

Sidereal Time of the Sun's Semidiameter Passing the Meridian. This column is useful for reducing a transit observation of either limb of the Sun, when only one has been observed, to the transit of its centre. *Add for first limb; subtract for last limb.* If the observation is for Mean Solar Time, subtract 0s. 18.

Moon South Washington. This column gives the Mean Solar Time of the Moon passing the Meridian of Washington. This time is nearly the same for all parts of the Union.

Moon's Rising or Setting. These columns give the Mean Solar Time of the *Moon's Setting*, from *Change* to *Full*, and of its *Rising* from *Full* to *Change*.

The times of High Water, which have heretofore been given in the calender pages, are removed to pages 34 to 37, where they are given for Boston, Mass., New York, N. Y., Philadelphia, Pa., and Charleston, S. C. By this arrangement sufficient space is obtained for both the *morning* and *evening Tides*.

Day of the Year. This column gives the number of each day of the year, commencing January 1, and is of frequent use in many astronomical calculations.

Fraction of the Year. The decimal numbers in this column indicate the fraction of the year for any day which has elapsed since the mean noon or the preceding midnight of January 1, 1845, according as Astronomical or Civil Time is made use of.

The two last columns afford a convenient method of computing *interest*. For example, suppose a note of hand for $1012 is given on February 17th, 1845, and is to be paid at the end of 95 days: Required the time when it becomes due, and the amount of interest at 6 per cent.? Against Feb. 17th we have 48 for the day of the year; adding 95 days to this, we have 143, and looking over the following pages we find this number against May 23d, which is therefore the day on which the note becomes due. Also, against Feb. 17th is the decimal .129, and against May 23d, the decimal .389: the difference, .260, is the fraction of a year for which the interest is to be computed: Mul-

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tiplying the principal by this decimal, and the product by the rate per cent., will give the interest required: or—

	Date.	Day of Year.	Dec. of Year.
Given	Feb. 17th	48	.129
	add	95	
Due	May 22d	143	.369
		Difference	.260

Principal	$1012.00
Fraction of Year	.260
	60.72
	202.4
First Product	262.12
Rate per cent	.06
Interest required.	15.79

The results by this method are not always precisely the same as those which are obtained in Banks, and monied institutions generally, but in the ordinary business of the country it will answer every purpose. As the method requires no attention to the number of months, no multiplying and dividing for odd days, or for different rates of interest, it will be found more simple and convenient than any other in the ordinary cases where extensive *interest tables* are not employed.

For the following method, which is more consistent with the rules of institutions for loaning money, we are indebted to the kindness of Mr. W. B. Hill, Secretary of the Pennsylvania Life Insurance Company.

Rules to find the Interest on any amount, for any number of days, at any rate per cent. per annum, by the subjoined Table.

I. *When the time is less than sixty days*—Multiply the amount by the number opposite the days, and the product will be the interest in mills, if the principal is dollars; or hundreds of mills, if the principal has two figures of cents.

II. *When the time is more than sixty days*—Take one per cent. for every sixty days and for the remaining days, as in Rule I.

N. B. The above rule shows the bank interest at 6 per cent. per annum; if the correct interest is required, deduct 1-73d part of the bank interest. If the rate per cent. is to be 5 instead of 6, deduct 1-6th part; if at 7 per cent., add 1-6th of the interest at 6 per cent., &c.

Should the interest be required for months and days, take ½ per cent. for each calendar month's interest, and for the remaining days, as in Rule II.

TABLE.

Days.	Multiplier.	Days.	Multiplier.	Days	Multiplier.	Days.	Multiplier.
1	1/6	16	2 2/3	31	5 1/6	46	7 2/3
2	1/3	17	2 5/6	32	5 1/2	47	7 5/6
3	1/2	18	3	33	5 5/6	48	8
4	2/3	19	3 1/6	34	5 2/3	49	8 1/6
5	5/6	20	3 1/3	35	5 5/6	50	8 1/3
6	1	21	3 1/2	36	6	51	8 1/2
7	1 1/6	22	3 2/3	37	6 1/6	52	8 2/3
8	1 1/3	23	3 5/6	38	6 1/3	53	8 5/6
9	1 1/2	24	4	39	6 1/2	54	9
10	1 2/3	25	4 1/6	40	6 2/3	55	9 1/6
11	1 5/6	26	4 1/3	41	6 5/6	56	9 1/3
12	2	27	4 1/2	42	7	57	9 1/2
13	2 1/6	28	4 2/3	43	7 1/6	58	9 2/3
14	2 1/3	29	4 5/6	44	7 1/3	59	9 5/6
15	2 1/2	30	5	45	7 1/2	60	10

NOTE.—When the multiplier has a fraction of ⅔, multiply by the next whole number, and deduct ⅓; or 5-6, use the next multiplier and deduct 1-6. Thus, for 28 days, instead of multiplying by 4⅔, multiply by 5 and deduct ⅓; and for 35 days, instead of multiplying by 5 5-6, multiply by 6 and deduct 1-6.

With very little practice, the multipliers, which are nothing but the quotients found by dividing the days by 6, are so impressed upon the memory that it will not be found necessary to refer to the Table for them.

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Examples. What is the bank interest on $973 for 23 days?

The multiplier for 23 days is 3 5-6, but according to the note, use 4 and deduct 1-6.

Thus, 973 × 4 = 3892
Deduct 1-6 of 973 162

3730 Interest in mills.

Or, $ 3.73

What is the true interest of $8347 for 53 days?

Multiply by 8 5-6, or by 9 and deduct 1-6 8347 × 9 = 75123
Deduct 1-6 of 8347 1391

73.732 Bank Interest
Deduct 1-73 ..... 1.01

72.72 True Interest.

What is the mercantile interest of $763 dollars for 6 months and 18 days?

6 months at ½ per cent. per month = 3 per cent., or 22.89
And for 18 days multiply 763 by 3, according to the table 2.289

$ 25.179

When the result shows more than 5 mills call it the next cent, and if less do not regard it; therefore, instead of 25 dollars 17 cents and 9 mills, the interest is called $25.18.

If a note is *shaved at* 9 *per cent. per annum in the market*, what is to be taken off for cashing $656, having 73 days to run?

656 for 60 days = 1 per cent. ..... $ 6.56
13 days = 656 × 2 1-6 ..... 1.42

Bank interest at 6 per cent. 7.98
Add ½ for 3 per cent. 3.99

Amount of the Shave 11.97

Moon's Phases, &c. The time of the Moon's Phases, &c., may be found for any place from the Time given in the Calendar, by adding or subtracting the difference of longitude according as the place is East or West of Washington.

Beginning and End of Twilight. The times of beginning for the *Morning*, and of End for the *Evening Twilight*, are given in these columns at intervals of five days, from which the times for the intermediate days may be readily estimated.

Solar Ephemeris. (Pages 38 to 43.)

All the articles in this Ephemeris, with the exception of the logarithm in the column headed "log. δ_1," were taken from the British Nautical Almanac. The logarithms of δ_1, have been computed expressly for the present work. The *Sun's Right Ascension and Declination*, log. δ_1, and the *Equation of Time*, are adapted to Greenwich *Apparent Noon*, or the instant when the Sun's centre is on the Greenwich Meridian. The *Sidereal Time* and *logarithms of the Earth's Radius Vector* are given for the instant of Greenwich *Mean Noon*.

Sun's Right Ascension. The Sun's Right Ascension, here given, is affected with Aberation, and reckoned from the true Equinox; it is therefore the *Apparent* Right Ascension and the Sidereal Time at Apparent Noon, or the time which ought to be shown by a Sidereal Clock, at that instant. The Right Ascension for any other time may be found by means of the numbers in the column entitled "Diff. for 1 hour." For example, required the Sun's Right Ascension, January 25th, at 3h 36m 57s, Philadelphia Apparent Time.

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Given Time	3 36 57		
Add West Longitude of Philadelphia	5 0 41.90	Diff. 1 hour, s.	
		h. Jan. 25th,	10.430 log. 1.0183
Greenwich Apparent Time	8 37 38.90	= 8.6275 (by Tab., p. 110,)	log. 0.9359
	1 29.98		1.9542
R. A. at Green. Apper. Noon, Jan. 25th,	20 28 10.34		
R. A. required	20 29 40.32		

Sun's Declination. The numbers in this column are for the Sun's *Apparent* Declination, which is its angular distance from the Equator, measured on the Meridian, and is North or South according as the letter N. or S. is prefixed to the title at top of the column. The Declination for any Time and Meridian may be found by means of the numbers in the column of "Diff. for 1 hour," in the same manner as the Right Ascension. It may also be obtained, and more accurately, by means of log. δ_1. For this purpose, log. δ_1 should be taken out for near the middle of the interval from Greenwich Apparent Noon, and should have the positive sign when the Sun's variation is toward the North, and the negative sign when toward the South. It is also the practice in Astronomical computations to consider North Declination positive and South Declination negative. Rule: Find half the given interval in units of an hour, multiply it by diff. log. δ_1 for 1 hour, and apply the product to log. δ_1 for Apparent Noon; to this add the log. of the whole interval (reduced to seconds) and the constant 4.76246; the sum will be the log. of the quantity which must be applied to the Declination at Apparent Noon, to obtain the Declination required. With Babbage's or Callet's Tables, the log. of the interval can be taken out without any reduction; but if these are not employed, it will be better to reduce the interval to units of an hour, as in the last example, and add its log. to log. δ_1, and the constant 8.31876; which will give the same result as before. Example: required the Sun's Declination for the same time as in the last example. Here the half interval is 4.3, log. δ_1 at Apparent Noon + 3.24440, and "diff. for 1 hour," 43. Then 4.3 × 43 = 181, and this added to 3.24440 gives log. δ_1 3.24621 for the middle interval.

h. m. s.	log. δ_1,	+ 3.24621			+ 3.24621
8 37 38.9	log.	4.49218	8.6275 h	log.	0.93588
	const.	4.76246		const.	8.31876
	log.	+ 2.50085		log.	+ 2.50085
		′ ″			′ ″
		+ 5 16.3			+ 5 16.3
Dec. at Apparent Noon		— 19° 6 18.7			19 6 18.7
Sun's Declination required		— 19 1 2.4			19 1 2.4

Log. δ_1 is mostly used in for computing the Equation to Equal Altitudes, as will be shown in the Explanation of the Tables.

Equation of Time. When time is deduced from observations of the Sun, the *immediate* result is *apparent* time; to convert it into Mean Time, the Equation of Time is necessary, and it is to be applied according to the word "add" or "sub." at the top of the column. The Equation of Time may be obtained for any Time and any Meridian by means of "diff. for 1 hour," as in the foregoing example for the Sun's Right Ascension.

Sidereal Time at Mean Noon is the angular distance of the First Point of Aries, or the true Vernal Equinox, from the Meridian, at the instant of Mean Noon, or the time which ought to be shown by a Sidereal Clock when the Mean Time Clock indicates 0h. 0m. 0s. Sidereal Time at Mean Noon is useful in cases where Mean Solar Time is to be deduced from observations of the heavenly bodies, as will be shown in the explanation of the Tables. Page. 66.

The *Logarithm of the Earth's Radius Vector* is the logarithm of the distance between the centre of the Earth and the *apparent* place of the centre of the Sun, the mean distance, or the semi-axis major of the orbit, being considered as unity.

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Lunar Ephemeris. (Pages 44 to 49.)

The Moon's Right Ascension, Declination, and Horizontal Parallax, are given in this Ephemeris for every day at Greenwich Mean Noon and Midnight, and are taken from the British Nautical Almanac.

The *Moon's Right Ascension* is its angular distance from the First Point of Aries, as it would appear if seen from the centre of the Earth.

The *Moon's Declination* is its angular distance from the Equator, measured on the Meridian, as it would appear from the centre of the Earth.

The *Moon's Horizontal Parallax* is the greatest angle under which the Earth's Equatorial Semidiameter would appear if seen from the centre of the Moon. The *Moon's Semidiameter* is readily obtained by adding the constant log. 9.43537, to the log. of its Horizontal Parallax. For example: The Moon's Horizontal Parallax at Greenwich Mean Midnight, March 9th, is 57′ 12″.1, required the Semidiameter.

Hor. Parallax ..... 57′ 12″.1	log.	3.53556
	const.	9.43537
Required Semidiameter ..... 15′ 35″.3	log.	2.97093

The Semidiameter is requisite to obtain the position of the Moon's centre from an observation of either *limb*, as in all cases of altitudes and lunar distances. The Horizontal Parallax is used for finding the Parallax in altitude, Right Ascension, &c., for the purpose of reducing an observation of the Moon made on the surface of the Earth, to what it would be if made at the centre.

The Horizontal Parallax may be found for any time and any meridian, sufficiently exact for most purposes, by simple proportion. For example: required the Horizontal Parallax for the same time as in the example for the Sun's Right Ascension, page 290. The Parallax at Greenwich Mean Noon, January 25th, is 54′ 36″.9: subtracting this from the Parallax at the following Midnight, 54′ 26″.9, we have—10″.0, and the proportion will be

$$\frac{8.6\text{ h.} \times (-10''.0)}{12\text{ h.}} = -7''.2,$$

which, applied according to its sign to 54′ 36″.9, gives 54′ 29″.7, the Parallax required. Where extreme precision is necessary, the proportion in some cases may require to be corrected on account of second differences.

The Moon's Right Ascension and Declination may also be found by simple proportion, near enough for many purposes, but where great accuracy is necessary, the corrections required by the *second*, and in some cases, the higher orders of *differences*, must be taken into account.

The following method of Interpolation, which will give the Moon's true place and hourly motions for any portion of an interval of 12 hours, to any required degree of precision, is from Mr. Walker's paper on Longitudes in the Transactions of the American Philosophical Society, Vol. VI, new series, page 248.

Let

$a_{,}$ = the Moon's place given in the ephemeris for the preceding noon or midnight.
a' = the Moon's place for the following midnight or noon.
$a = \frac{1}{2}(a_{,} + a')$.
b = the middle first difference.
c = the mean of the two middle second differences, or $\frac{1}{2}(c_{,} + c')$.
d = the middle third difference.
e = the mean of the two fourth differences, or $\frac{1}{2}(e_{,} + e')$.
f = the fifth difference.
t = the interval in seconds since the date for $a_{,}$.
m = the variation of the Moon's place for the interval (t — 6 h. 0 m. 0 s.).
n = the average hourly variation.
n' = the true hourly variation at the instant t.

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Enclosing in brackets the constant *log.* co-efficients.

Let

$$X = [5.3645163]\,(t - 6\text{ h. }0\text{ m. }0\text{ s.}).$$
$$X' = [0.42800]\,t\,(t - 12\text{ h. }0\text{ m. }0\text{ s.}).$$
$$X'' = [9.5229]\,XX'.$$
$$X''' = [9.6499]\,X'\,(t + 12\text{ h. }0\text{ m. }0\text{ s.})\,(t - 24\text{ h. }0\text{ m. }0\text{ s.}).$$

Then

$$m = b\,X + c\,X' + d\,X'' + e\,X'''.$$

$$n = [3.25527]\left(\frac{b + 2\,m}{t}\right)$$

$$n' = \tfrac{1}{12}\left(\left(b + \tfrac{1}{12}\,d - \tfrac{1}{120}\,f\right) + \left(c - \tfrac{1}{6}\,e\right)X + d\,X'\right)$$

For example: required the Moon's declination and hourly variations in declination for Dec. 9, 1844, at 5 h. 39 m. 25.65 s., Philadelphia Mean Time.

NOTE.—In performing operations on sexagesimal numbers, Babbage's "Table of the Logarithm of Numbers" will be found preferable to any other.

	h. m. s.
Given Time	5 39 25.65
Longitude of Philadelphia West	5 0 41.90
Greenwich Mean Time = t	10 30 7.55

Taking out, from the ephemeris, the three preceding and the three following declinations, we have—

Dec. d. h.	Declinations. ° ′ ″	1st Diff. ′ ″	2d Diff. ′ ″	3d Diff. ″	4th Diff. ″	5th Diff. ″
8 0	−20 17 1.4					
		− 51 42.0				
8 12	−21 8 43.4		+ 23 8.5			
		− 28 33.5		+ 61.3		
9 0	a, = −21 37 16.9		c, = + 24 9.8		e, = − 54.3	
		b = − 4 23.7		d = + 7.0		f = − 2.7
9 12	a' = −21 41 40.6		c' = + 24 16.8		d' = − 57.0	
		+ 19 53.1		− 50.0		
10 0	−21 21 47.5		+ 23 26.8			
		+ 43 19.9				
10 12	−20 38 27.6					
Proof		− 84 39.2	+ 95 1.9	+ 66.3	− 111.3	− 2.7
		+ 63 13.0	− 51 42.0	− 50.0	+ 61.3	− 54.3
		− 21 26.2		18.3		
		− 20° 17 1.4		+ 23′ 8.5		
		− 20 38 27.6	+ 43 19.9	+ 23 26.8	− 50.0	− 57.0

Performing the operations indicated in the formula, we have—

a = − 21° 39′ 28.7″ $\quad d$ = + 7.0″ $\quad b + \frac{1}{12}\,d - \frac{1}{120}\,f$ = − 4′ 22.094″

b = − 4 23.7 $\quad e$ = − 55.75 $\quad c - \frac{1}{6}\,e$ = − 24 22.575

c = + 24 13.3 $\quad f$ = − 2.7

t = 10 h. 40 m. 7.55 s.

t − 6 h. = + 4 40 7.55

t − 12 = − 1 19 52.45

t + 12 = + 22 40 8.

t − 24 = − 13 19 52.

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const. 5.3645163	const. 0.42860	const. 9.5229
log. $(t - 6\text{ h.}) + 4.2256044$	log. $t + 4.58442$	log. $X + 9.5900$
log. $X + 9.5900207$	log. $(t - 12\text{ h.}) - 3.68056$	log. $X' - 8.6930$
log. $b - 2.4211101$	log. $X' - 8.69298$	log. $X'' - 7.8059$
log. $b\,X - 2.0111308$	log. $c + 3.16236$	log. $d + 0.8451$
	log. $c\,X' - 1.85534$	log. $d\,X'' - 8.6510$

$b\,X$ —	0° 1′ 42.596″
$c\,X'$ —	7.167
$d\,X''$ —	0.045
$e\,X'''$ —	0.481
m —	0 1 50.289
α —	21 39 28.70
☽'s True Dec. — $\alpha + m$ —	21 41 18.99

const.	9.6499
log. X'	$- 8.6930$
log. $(t + 12\text{ h.})$	$+ 4.9117$
log. $(t - 24\text{ h.})$	$- 4.6812$
log. X'''	$+ 7.9358$
log. e	$- 1.7462$
log. $e\,X'''$	$- 9.6820$

$2\,m$ —	3 49.578
b —	4 23.700
$b + 2\,m$ —	8 4.278
log. $(b + 2\,m)$ —	2.68509
comp. log. t	$+ 5.41558$
const.	3.25527
log. n —	1.35594
n —	22.696″
log. $12\,n'$	$+ 2.48515$
log. 12	1.07918
log. n'	$+ 1.40597$
n'	$+ 25.525''$

log. d	9.84510
log. X'	$- 8.69298$
log. $d\,X'$	$- 9.53808$
log. $(e - \frac{1}{6}\,e)$	$+ 3.165118$
X	$+ 9.590021$
log. $(e - \frac{1}{6}\,e)\,X$	$+ 2.755139$
$(e - \frac{1}{6}\,e)\,X$	$+ 9'\ 29.035''$
$b + \frac{1}{13}\,d - \frac{1}{120}\,f$	$- 4\ 23.094$
	$+ 5\ \ 5.941$
$d\,X'$	$- \ \ 0.345$
$12\,n'$	$+ 5\ \ 5.596$

Unless extreme accuracy is required, we may neglect the corrections beyond that for the *second* differences, and take—

$$m = b\,x + c\,x'$$

$$n = [3.25527]\left(\frac{b + 2\,m}{t}\right)$$

$$n' = \tfrac{1}{12}\left(b + \tfrac{1}{12}\,d + c\,z\right).$$

This will require but four quantities from the ephemeris, two preceding and two following the time t.

Lunar Distances. (See page 167.)

Moon's Place, Church Festivals, and Astronomical Phenomena. (Pages 60 to 62.)

Moon's Place. The symbols and numbers in this column indicate the Moon's Place in the *Signs of the Zodiac*, to the nearest degree of longitude, for every day at Greenwich Mean Noon.

Astronomical Phenomena. This column gives the conjunctions in Right Ascension of the Planets with the Moon, with each other, and with certain Stars; also, the times when the Planets are in those parts of their orbits most favourable for observation.

Ephemeris of the Principal Planets. (Pages 64 and 65.)

In these pages the *Meridian Passage* and *Declination* of the Planets are given for every third day, to the nearest minutes of time and space, which will

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be sufficient for the purpose of identifying these bodies in the heavens, and for computing, by means of the table of Semi-diurnal Arcs, (pages 102 and 103,) the time of their Rising or Setting.

Eclipses of Jupiter's Satellites. (Page 63.)

In this page are given the Greenwich Mean Astronomical Times of all those Eclipses of the Satellites which can happen in the absence of Sunlight above the horizon of any part of the American Continent, between the parallels of 10° and 60° North Latitude.

The Eclipses of Jupiter's Satellites, especially of the first, afford the ready means of determining the longitude; all that is necessary to be known being the exact time of observation: the difference between this time and the time at Greenwich shows the longitude (*in Time*) at once. Suppose the Emersion of the first Satellite, August 16, 1845, to be observed to take place at 15h. 29m. 58. 6s. mean astronomical time at the place of observation. By reference to the page before us, it appears that this Emersion will take place at Greenwich at 16h. 53m. 2.8s. Greenwich Mean Time: the difference, 5h. 0m. 41.9s. is the difference of longitude between the place and Greenwich; and because the time of observation is less than the given Greenwich time, we infer that the place is *West* of Greenwich. From the difficulty of observing the exact instant of Immersion or of Emersion, the longitude obtained by this method is not very *accurate;* yet when other means are not at hand, this may be resorted to as an easy and convenient one for determining approximately the difference of meridians.

Fixed Stars. (Pages 68 to 84.)

The two first of these pages give the Apparent Right Ascension and Declination of *α* Ursæ Minoris (Pole Star) for every day of the year; and the following fifteen pages the Right Ascensions and Declinations of 75 principal Stars for every *tenth* day.

The hours and minutes of Right Ascension, and the degrees and minutes of Declination, are placed at the heads of the columns as constants, and belong equally to all the numbers below them. This arrangement has rendered it necessary, in some instances, to continue the seconds beyond 60, as the width of the page would not permit of otherwise indicating any change in the minutes. Thus, the Apparent Right Ascension of 51 (Hev.) Cephei, on December 6, 1844, is registered 6h. 25m. 96.46s., and is to be read 6h. 26m. 36.46s. Again, the Declination of θ^1 Ceti, on March 1, 1844, is registered S, 8° 58′ 80″.1, and is to be read S. 8° 59′ 20″.1.

The numbers at the top of the column, immediately beneath the Stars' names, are given to facilitate the reduction of the Sidereal Time of a Transit observation to Mean Solar Time. These constants, which are given only for the High School Observatory at Philadelphia, in longitude 5h. 0m. 41.9s., may be adapted to any other meridian by adding 0.1638s. for each minute of Easting from this longitude, and by subtracting 0.1638s. for each minute of Westing. For example, let it be required to adapt the constant for *α* Scorpii (page 64) to the meridian of the Cambridge Observatory, in longitude 4h. 44m. 31.0s.: the difference of longitude is 16.2m. East. The constant given for *α* Scorpii is 16h. 15m. 30.21s., and adding 16.2 × 0.1638s. = 2.65s., we have 16h. 15m. 32.86s. The same correction will adapt all the constants to that meridian. For circumpolar Stars, the constants are given for both the Upper and Lower Transit, and are distinguished by the letters *U* and *L*.

To determine the Mean Solar Time of a transit observation, we have only to add to the Mean Time of the *preceding* Greenwich Sidereal Noon, the constant for the observed Star, and the given *seconds* of its Right Ascension. For example, required the Mean Solar Time of transit of *α* Aquilæ for the High School Observatory and for the Cambridge Observatory, August 20th, 1845?

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	High School.		Cambridge.
	h. m. s.		h. m. s.
Preceding Greenwich Sidereal Noon, Aug. 19th,	14 5 57.05	.....	14 5 57.05
Constant for α Aquilæ (page 66)	19 38 56.89	....+2.65s.	19 38 59.54
Seconds of R. A., August 20th	14.28	.....	14.28
Mean Time required.....	9 45 8.23		9 45 10.88

From the Vernal Equinox to the Star's conjunction with the Sun, the Mean Time of Sidereal Noon must be taken out for the day preceding the given date. From the conjunction to the Next Vernal Equinox, it must be taken out for the given date.

Elements for facilitating the Computation of Occultations of certain Stars by the Moon. (Pages 85 to 87.)

These pages contain a list of such Occultations of all the Stars contained in the *Astronomical Society's Catalogue*, as can take place in the absence of Sunlight to any part of the American Continent, between the parallels of 10° and 50° North Latitude, those only of the seventh magnitude being omitted during that period of each lunation comprised between the first and last quadratures, the moonlight being too powerful at this time to admit of observing the times of their Immersions and Emersions with sufficient precision. By means of the constants T, H, p, q, p', q', the *Immersions* and *Emersions* for any place, can be computed with great facility. The method of proceeding with these constants will be given in the Explanation of the Tables. See page 313.

Obliquity of the Ecliptic. (Page 59.)

The apparent inclination of the plane of the Ecliptic to that of the Equator is here given for every 10th day of the year, and continued to January 5 of the following year, marked December 36 for the sake of convenience. This inclination is ever varying, as well from the effect of its mean diminution, as of the nutation of the earth's axis: it is an important element in deducing the positions of the heavenly bodies, with reference to either of the planes, when we know their positions with respect to the other; as, for instance, in computing Right Ascensions and Declinations from Longitudes and Latitudes, and *vice versa*. If the apparent Obliquity be required for any date not to be found in the Table, it may be obtained by simply taking the proportional part of the variation of the obliquity corresponding to the interval which comprises the given date. Thus, the apparent Obliquity on October 31, 1844, is 23° 27′ 30″.76. For the variation of the Obliquity in the ten days between October 27th and November the 6th, is 0″.28 or 0″028 for one day, and this being multiplied by 4, the number of days between the 27th and the 31st, gives 0″.11, to be subtracted from the Obliquity of October the 27th. For most purposes, however, the Obliquity corresponding to the date in the Table nearest to the given date is sufficient, as is evident from an inspection of the quantities.

Sun's Horizontal Parallax. (Page 59.)

The Sun's Horizontal Parallax is the *greatest* angle under which the equatorial semidiameter of the earth would appear at the Sun's centre. It varies inversely as the distance, and the numbers in this column show the values for every tenth day of the year.

The Parallax serves for reducing a Solar observation, made at the surface of the earth, to what it would have been if made at the centre.

Sun's Aberration. (Page 59.)

The progressive motion of light, combined with the motion of the Earth in its orbit, causes the Sun to appear in a different position from that which he really occupies, the true position being always in advance of the apparent. The numbers in this column indicate, for every tenth day of the year, the

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amount of Aberration, or the quantity to be applied to the *true* longitude of the Sun to obtain the *apparent* longitude. The longitudes derived from the Solar Tables include Aberration, and are therefore *apparent* longitudes, such as are contained in this Ephemeris. If the *true* longitude of the Sun be wanted, as is the case in finding the longitude of the Earth for the calculation of the Geocentric place of a body, the aberration must be applied with a contrary sign. Thus, on June 10, 1844, at Mean Noon, by *adding* 20″.05, the amount of aberration, to 79° 37′ 35″.2, the apparent longitude of the Sun, we obtain 79° 37′ 55″.25 for the true longitude.

Equation of the Equinoxes. (Page 59.)

The Solar and Planetary Tables furnish us with the places of the Heavenly Bodies referred to the Mean Equinox; but the true place of the Equinox at any time differs from its mean place, by a quantity which is termed the Equation of the Equinoxes: and the numbers here given show the value of the Equation for every 10th day of the year. They are to be applied, with their proper signs, to the Longitudes reckoned from the Mean Equinox, to obtain the values with respect to the true Equinox.

If the Longitude of a body be given with reference to the true Equinox, as in this Ephemeris, and it be required to find its Longitude reckoned from the Mean Equinox, the Equation of the Equinoxes must be applied with a contrary sign. Thus, the longitude of the Sun, reckoned from the true Equinox, on July 20, 1844, at Mean Noon, is 117° 46′ 56″.6, and the Equation of the Equinoxes is + 17″.56; therefore, applying it with the contrary sign, the difference, 117° 46′ 39″.04, is the Sun's Longitude from the *Mean* Equinox on that day.

The Equation corresponding to any date not contained in the Table, may be obtained in the usual way by interpolation.

The Equation of the Equinoxes in Right Ascension, in a similar manner, enables us to find the *apparent* point of intersection of the Ecliptic *on the Equator;* and is necessary in computing Sidereal Time.

Mean Longitude of ☊'s Ascending Node. (Page 59.)

This column contains the Mean Longitude of the Moon's Ascending Node, at Mean Noon of every 10th day of the year, reckoned from the Mean Equinox. The place for any intermediate day is easily found from the daily motion inserted at the foot of the column. The Longitude of the Node is necessary in the calculation of Nutation; it is also sometimes used to determine roughly the Stars which are likely to undergo occultation by the Moon.

Eclipses of the Sun and Moon, and Transit of Mercury. (Pages 89 to 98.)

These pages contain all the information relative to the Eclipses of the Sun and Moon and the Transit of Mercury that can be of general interest. The co-ordinates, &c., of the Solar Eclipse of May 6th are given at intervals of ten minutes for the whole duration of the Eclipse on the Earth. This arrangement will be found very convenient for the computer, the intervals being so small that the hourly variations of the quantities may be considered uniform for any one interval, which will render any corrections for second differences unnecessary. The method of computing these quantities, with their application to the determination of the phases of an Eclipse for a particular place, will be found at page 170.

With the constants T, λ, log. sin. β, log. cos. β, and log. g, given on page 98, the phases of the Transit of Mercury may be computed for any place on the Earth where it is visible, by the formulæ given on the same page.

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Saturn's Ring. (Page 99.)

The quantities here given enable us to determine the position of Saturn's Ring, at intervals of 40 days, throughout the year, and whether it be visible or not. The value of p shows the position of the minor axis of the Ring with respect to a circle of declination, those of a and b the Ring's apparent magnitude, and a comparison of those of l and l' its visibility or otherwise. For the plane of the Ring to be *visible*, it is necessary that the Sun and the Earth should be elevated on the same side of it, which is the case during the whole of 1844. The circumstances which determine the *invisibility* of the Ring are, 1st, when its plane passes through the centre of the Sun, or $l' = 0$; 2d, when it passes through the centre of the Earth, or $l = 0$, and at this time b also $= 0$; 3d, when the Sun and Earth are on different sides of the plane of the Ring, for the Earth in this case will have the unilluminated side of the Ring turned towards it.

Greatest Libration of the Moon's Apparent Disc. (Page 99.)

The Moon's Libration is here supposed to take place in the plane of its Orbit: and by the time of the greatest Libration of her apparent Disc, is to be understood the instant at which, to an observer at the centre of the Earth, the variation of the Disc from its mean state has attained its maximum. The right-hand column indicates the quadrant of the Moon's Disc in which the Libration takes place, and in which the greatest change of the Moon's surface will become visible.

Illumined Portion of the Discs of Venus and Mars. (Page 99.)

The numbers here given represent the versed sines of the illuminated portions of the Discs, the apparent diameter of the Planets being considered as *unity*.

Factors for Computing the Approximate Height of Spring Tides. (Page 99.)

These factors will be found serviceable to farmers who cultivate lands on the sea-coast, which are liable to overflowing from any unusual rise of the Tide, and to those who conduct some of the labours and operations of sea-ports. They must not, however, be depended on as always giving, approximately even, the rise of tide which actually takes place, since they cannot take into account the great and sudden variations occasioned by storms. The most we can require of them is, the rise that may be expected under average circumstances. The factors can be used for those places only, where the unit of altitude has been determined from observations of the Tides. Generally, however, the same unit will be nearly the same for a considerable extent of coast. The *unit of altitude* is the number expressing the rise of that tide which takes place about a day and a half after *New* or *Full* Moon, the Sun and Moon being in the Equator, and at their mean distance from the Earth, at the time of *Change* or *Full*. This number, expressing the rise in *feet*, is given for several places on the coast, in the Table on page 286. To determine the rise that may be expected at any Spring Tide, we have only to multiply the unit of altitude by the factor for the given *Change* or *Full*. For example,—Required the rise of the Spring Tide following the Full Moon of Aug. 17th, at Cape Cod Harbour, Mass.? The unit of altitude for this place (page 138) is 13.9 feet, and the factor for the given *Full* (page 85), is 1.08, and multiplying, we have $13.9 \times 1.08 = 15.0$ feet, for the rise required.

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EXPLANATION OF THE TABLES,

WITH EXAMPLES OF THEIR APPLICATION TO CASES OF PRACTICE.

Table for converting Sidereal Time into Mean Solar Time. (Page 101)

This Table is used in connection with the *Mean Time of Transit of the First of Aries*, for the purpose of deducing Mean Solar Time from its corresponding Sidereal Time. The Mean Solar Time of the Transit of the First Point of Aries, or Mean Solar Time of *Sidereal Noon*, is given for every day at Greenwich, in the last column of the first calendar page of each month. To determine the Mean Time of Sidereal Noon at any other meridian, let

$\mathfrak{P}$ = the Mean Time of Sidereal Noon at Greenwich from this column,
$\mathfrak{P}_1$ = the Mean Time of Sidereal Noon at the given place,
l = the West Longitude of the place, expressed in hours as integers,

and we shall have

$$\mathfrak{P}_1 = \mathfrak{P} - 9.82956\,l.$$

or, using the constant given with the Table, and expressing l in seconds, we shall have

$$\mathfrak{P}_1 = \mathfrak{P} - l\,[\bar{7}.4374192].$$

Example:—Required the Mean Solar Time of Sidereal Noon at the High School Observatory, in Philadelphia, October 17, 1844, the Longitude of the Observatory being 5 h. 0 m. 41.9 s.?

Constant	$\bar{7}.43693$	Or,	9.8296 s.
Log l	4.25628		l = 5.0127 h.
Log.	1.69251		49.1480
			983
	49.26 s.		98
$\mathfrak{P}$ October 18,	10h. 13m. 58.54		69
Mean Time of Sid. Noon at High School Observatory = $\mathfrak{P}_1$	10 13 9.28		49.26 s.

The correction $l\,[\bar{3}.4374192]$, or 9.85648 l, will be constant for all Transits at one place.

The use of Mean Time of Sidereal Noon is convenient in all cases where Mean Solar Time is to be deduced from observations of the Stars, the immediate result of which is Sidereal Time. To convert *Sidereal* into its corresponding *Mean Solar Time*, subtract the correction for West Longitude, as in the above example, from the *preceding* Greenwich Sidereal Noon, diminished by 4 minutes; to this add the Sidereal Time and the corrections from the first Table on page 87: The sum will be the corresponding Mean Solar Time.

Example. By an observation at the High School Observatory, in Philadelphia, March 10, 1842, the Sidereal Time was found to be 9 h. 30 m. 56.7 s.: Required the corresponding Mean Solar Time?

	h. m. s.
Mean Time of preceding Sid. Noon diminished by 4 m. March 10, 1842,	0 44 52.04
Constant correction for Longitude of Observatory	49.26
Mean Time of preceding Sid. Noon at Observatory, diminished by 4m.	0 44 2.78
Sidereal Time of observation	9 30 56.70
Correction for 9 h. (Table page 68)	2 18.534
" 30 m. "	5.085
" 57 s. "	2.844
Mean Solar Time required, March 10, 1842	10 17 25.94

Example. At the same place, July 20, 1844, suppose an observation to be at 13 h. 16 m. 58.53 s. Sidereal Time: Required the Mean Solar Time?

	h. m. s.
Mean Time of preceding Sid. Noon diminished by 4 m., July 19,	16 7 50.25
Constant correction for Longitude of Observatory	49.26
Mean time of preceding Sid. Noon at Observatory diminished by 4 m.	16 5 59.71
Sidereal Time of observation	13 16 58.53
Correction for 13 h. (Table page 87)	1 39.216
" 16 m. "	7.379
" 59 s. "	2.839
Mean Solar Time, July 20,	5 25 48.94

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In taking out the Mean Time of Sidereal Noon from its proper column, we can decide whether the First Point of Aries has passed the Meridian by knowing approximately the Mean Solar Time of observation. If the observation is made after the Transit for that day, take out the Transit against the date: If before, take out the Transit of the day previous.

In Observatories, or wherever observations are to be continued for some time at the same place, it will be best to compute the *constant correction for Longitude*, as in the example; but in detached instances, it will be found more convenient to add the West Longitude to the Sidereal Time, and again to subtract it from the Solar Time. Taking the last example—

	h. m. s.
Sidereal Time at the High School Observatory, July 20th, 1844	13 16 58.53
West Longitude of Observatory, *add*	5 0 41.9
Greenwich Sidereal Time	18 17 40.43
Correction for 18h.	0 50.068
" 17m.	7.215
" 40s.	2.891
Next preceding Greenwich Sid. Noon diminished by 4m. July 19	16 7 50.25
Sum = Greenwich Mean Solar Time ..... July 20	10 26 30.85
West Longitude of Observatory, *subtract*	5 0 41.9
Observatory Mean Solar Time ..... July 20	5 25 48.95

Table for Converting Mean Solar into Sidereal Time. (Page 101.)

Sidereal Time is a very important element in all computations connected with observations of the Stars, and is necessary in all cases where their Altitudes, Azimuth, Hour-angles, &c., are to be taken into consideration. For this purpose, and where a Sidereal Time-keeper is not employed, Sidereal Time must be determined from Mean Solar Time by means of the second Table on page 68, and the last column of the second page of each month in the Calendar pages. In this column, the Greenwich Sidereal Time at Greenwich Mean Noon is given for every day.

To determine the Sidereal Time for any other Meridian, let

S = Greenwich Sidereal Time at Greenwich Mean Noon,
S_1 = Sidereal Time at Mean Noon at the given place,
l = the West Longitude of the place, expressed in hours as integers;

Then

$$S_1 = S + 9.85648\, l.$$

Or, using the constant given with the Table, and expressing b in seconds of Time,

$$S_1 = S + l\,[\overline{7}.4374192].$$

Example. Required the Sidereal Time corresponding to Mean Noon, December 29, 1844, at the Cambridge Observatory, in Longitude 4 h. 44 m. 30.5 s.

Log. l		4.23225
Constant		$\overline{7}.43742$
Log.		1.66967
Correction		46.74 s.
(December 29, page 33)	S	18 32 9.19
Sid. Time at Observatory Mean Noon, Dec. 29, 1844 = S_1 ...		18 32 55.93

The correction for Longitude will be constant for the same place.

To convert *Mean Solar* into the corresponding *Sidereal* Time, determine the Sidereal Time at Mean Noon, as in the last example: To this add the given Mean Solar Time and the corrections from the last Table on page 68: The sum will be the Sidereal Time required.

Example. On September 25, 1844, the Moon's Conjunction in Right Ascension with the Planet Jupiter, takes place at 15h. 50m. 31.25s., Mean Time at the Cambridge Observatory: Required the corresponding Sidereal Time?

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	h. m. s.
Greenwich Sid. Time at Greenwich Mean Noon, Sept. 25	12 17 36.44
Constant for Longitude	46.74
Sidereal Time at Observatory Mean Noon, Sept. 25, 1844	12 18 23.18
Given Mean Time	15 50 31.25
Correction for 15h. (Table page 87)	2 27.847
" 50m. "	8.214
" 31s. "	0.085
Sid. Time at Observ. of the Moon's conj. with Jupiter. Sept. 25, 1844	4 11 30.58

This method will be most convenient for any place where continual observations are made; but in detached cases, it will be more expeditious to add the West Longitude to the given Mean Time, and again to subtract it from the Sidereal Time. Taking the last example—

	h. m. s.
Given Mean Time	15 50 31.25
West Longitude	4 44 30.50
Greenwich Mean Time of Conjunction	20 35 1.75
Correction for 20 h.	3 17.129
" 35 m.	5.750
" 2 s.	0.005
Sidereal Time at Greenwich Mean Noon	12 17 36.44
Greenwich Sidereal Time of Conjunction	8 56 1.07
West Longitude	4 44 30.5
Observatory Sidereal Time of Conjunction	4 11 30.57

Space into Time. (Page 102.)

The application of this and the following Table will be understood from example.

Example 1. In Piazzi's Catalogue, the Right Ascension of α Lyræ, for January 1, 1800, is registered 277° 32′ 29″.4: Required the Right Ascension expressed in Time?

	h. m. s.
Equivalent in Time for 277°	18 28 0.00
" " 32′	2 8.00
" " 29″	1.933
" " 0″.4	0.027
Right Ascension in Time	18 30 9.96

In taking out the equivalents for tenths of seconds of Space, we may use the units in the seconds' column as argument, taking care to remove the decimal point of the corresponding equivalent one place to the left. Thus, the equivalent for 4″ is 0.267 s., and for 0″.4, the equivalent is 0.0267 s., or 0.027 s.

Example 2. At Mean Noon in Longitude 71° 4′ 11″ West: Required the corresponding Mean Time at Greenwich?

	h. m. s.
Equivalent for 71°	4 44 0.00
" 4′	16 00
" 11″	0.73
Mean Time at Greenwich	4 44 16.73

Time into Space. (Page 103.)

Example 1. On May 6, 1842, an Immersion of Jupiter's first Satellite was observed to occur at 10 h. 12 m. 42.5 s. Mean Time at the place; and at Greenwich the same phenomena occurred at 14 h. 56 m. 59.2 s. Greenwich Mean Time: Required the longitude *in space* of the place of observation?

	h. m. s.
Mean Time at place of observation	10 12 42.5
Corresponding Greenwich Mean Time	14 56 59.2
Longitude of Place in Time	4 44 16.7

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Example — (Continued.)

Equivalent *in Space* for 4 h.		66° 0′	0.0″
" "	44 m.	11 0	0.0
" "	16 s.	4	0.0
" "	0.7 s.		10.5
Longitude *in Space* of the place of observation		71 4	10.5

Latitude by observations of the Pole Star.

The tables given in the former numbers of this work, for determining Latitude by observations of the Pole Star out of the meridian, are, in the present, omitted; the labour of making the several proportions required in their use being scarcely less than that of the determination by a more accurate method. This method is as follows:

$$\tan a = \cot \delta \cos h \qquad \sin b = \frac{\cos a \sin \varepsilon}{\sin \delta}$$

$$\phi = b \mp a$$

in which δ is the Star's Declination, h its Hour-angle, ε its Altitude corrected for refraction and the error of the instrument, and ϕ the required Latitude. Use upper sign when the Star is observed above the Pole; under sign when below the Pole.

Example. — On January 2, 1844, in Longitude 5h 0m 42s W. at 8h 14m 57s, Mean Time, the true Altitude of the Pole Star was 41° 15′ 53″.4: The Star's Declination was 88° 29′ 6″.1, and its Right Ascension was 1h 3m 33s.24: Required the Latitude:

	h m s
Mean Time	8 14 57
West Longitude	5 0 42
Greenwich Mean Time	13 15 39
Correction for 13h 15m 39s (Table page 101)	2 10.71
Sidereal Time at Greenwich Mean Noon	18 44 56.26
Greenwich Sidereal Time of observation	8 2 45.97
Sidereal Time at place. (Subtract West Long.)	3 2 3.97
Star's Right Ascension	1 3 33.24
(in Time) h	1 58 31.73

δ 88° 29′ 6″.1 $\quad \varepsilon$ 41° 15′ 53″.4: $\quad h$ 29° 37′ 56″

log cot δ	8.4223832	comp. log sin δ	0.0001519
log cos h	9.9391282	log cos a	9.9998853
log tan a	8.3615114	log sin ε	9.8192415
a	1°19′0″.9	log sin b	9.8192768
b	41 16 8.9		
$b - a$ $\quad \phi$	39 57 8.0	Required Latitude.	

Refractions. (Pages 104 to 107.)

These tables, originally constructed by Mr. Ivory, and published in the Philosophical Transactions of London, for the year 1823, were expanded and arranged in their present form by Mr. Galbraith. The *first*, which occupies the three first pages, contains the Mean Refractions for every 10′ of Zenith Distance, computed on the supposition that the English Barometer stands at 30 inches, and Fahrenheit's Thermometer at 50°. The subsidiary Tables on page 95, are employed to correct the Mean Refractions, according to the state

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of the Barometer and Thermometer. The *first* (External Thermometer) gives the correction depending on the temperature of the atmosphere: The *second* (Barometer) gives the correction depending on the density of the atmosphere, shown by the height of the barometric column: The *third* (Internal Thermometer) gives a correction for the barometric column, depending on the temperature of the quicksilver, as shown by the thermometer attached to the barometer.

The method of using these Tables will be understood from the explanation given at the bottom of page 93, and from the following example:

By an observed altitude of the Pole Star, its apparent Zenith Distance was 48° 43′ 55″; the external thermometer stood at 37°.9, the barometer at 30.27 inches, and the attached thermometer at 38°.2: Required the correction for Refraction?

Argument,	Zenith Distance (Z. D. 48° 43′.9, page 75)	log. r	1.82289
"	External Ther. (37°.9, page 77).....	log. t	0.01107
"	Barometer (30.27 inches, page 77)	log. β	0.00369
"	Internal Ther. (38°.2, page 77).....	log. τ	0.00051
		log. of Ref.	1.83816
Required Refraction.....			1′ 8″89
Observed Zenith Distance.....			48°43 55
True Zenith Distance.....			48 45 4
True Altitude			41 14 56

Equations to Equal Altitudes. (Pages 108 and 109.)

A very convenient method of finding the error of a Clock or Chronometer is, to determine from Equal Altitudes of the Sun, taken on both sides of the Meridian, the time of Noon as shown by the Time-keeper employed. If the Sun's Declination remained the same throughout the interval between the *forenoon* and *afternoon* observations, it is evident that half this interval, added to the time of the first observation, would immediately give the *apparent time* of Noon, as shown by the Chronometer; but as this is not the case, a correction must be applied on account of the variation in Declination. It is this correction which is termed the *Equations to Equal Altitudes*.

In these observations, the immediate result is *apparent noon*, which must be corrected by applying the equation of Time from the calendar pages, computed for Mean Noon at the place. Let

$T = \frac{1}{2}$ (Time of forenoon observation + Time of afternoon observation + 12 h.)
δ = the Sun's Declination, *positive* when North, *negative* when South.
δ_1 = twice the Sun's daily motion in declination, (log. δ_1 to be taken out from the Solar Ephemeris:) *positive* when towards the North, *negative* when towards the South.
L = the Latitude of the place, *positive* when North, *negative* when South.
E = the Equation of Time, *positive* when *additive*, *negative* when *subtractive*.
x = the error of the Chronometer, *positive* when fast, *negative* when slow.

Also let

$$a = \delta_1 \text{ A} \tan \text{L} \qquad b = \delta_1 \text{ B} \tan \delta,$$

and we shall have the Time of *Apparent Noon*, as shown by the Chronometer,

$$= T + a + b,$$

and for the error of the Chronometer

$$x = T + a + b - E - 12 \text{ h.}$$

Page 108 contains the logs. of A, which are to be taken out always with the *negative sign*. Page 109 contains the logs. of B, which are to be taken out *positive* when the Elapsed Time is less than 12 h., *negative* when more than 12 h. The Elapsed Time, or the interval between the times of corresponding observations, is the *Argument* for taking out the logs. of A and B. This argument in the Table is extended beyond the intervals which can elapse between forenoon and afternoon observations, so as to embrace cases where the first observation is made after noon, and the corresponding one the next forenoon.

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In these cases, the Equation of Time and the Sun's Declination must be computed for Mean Midnight at the place.

Example. On August 14, 1841, in Longitude 4 h. 31 m. 7 s., Latitude 45° 10′ 33″, the following Equal Altitudes were taken: The *Sun's Declination* at Mean Noon at place, was 14° 18′ 25″, the *double daily variation in Declination* was 37′ 5″.7 towards South, and the *Equation of Time* was 4 m. 22.17 s. (Clock before Sun.) Required the Error of the Chronometer?

By Chronometer. Times A. M.	Altitudes.	By Chronometer. Times P. M.	Data.
h. m. s.	° ′	h. m. s.	° ′ ″
8 52 50.0	39 35	3 9 40.0	L = + 45 10 33
53 20.0	39 40	9 10 0	δ = + 14 18 25
53 50.0	39 45	8 40.0	log. δ1 — 3.3475
54 20.0	39 50	8 10.0	E = — 4 22.17
54 50.0	39 55	7 40.0	
269 10.0		43 20.0	
Mean 8 53 50.0	Mean + 12 h.	15 8 40.0	
15 8 40.0		8 53 50.0	
2) 24 2 30.0	Elapsed Time	6 14 50.0	
T. 12 1 15.0			

log. δ1	— 3.3475		log. δ1	— 3.3475
log. A	— 7.7742	(Arg. 6 h. 15 m.)	log. B	+ 7.6092
log. tan L	+ 0.0027		log. tan δ	+ 9.4066
log. a	+ 1.1244		log. b	— 0.36.33
				m. s.
			b	— 0 2.31
			a	+ 0 13.39
			a + b	+ 0 11.01
			T.	12 1 15
Apparent Noon by Chronometer.....				12 1 26.01
			E +	4 22.17
				11 57 3.84
			12 h.	12 0 0.00
Chronometer slow of Mean Time: x —				2 56.16

Reduction to the Meridian. (Pages 110 and 111.)

Meridian Altitudes of the Heavenly Bodies are usually taken in Observatories, with the Mural Circle or with the Transit Circle, at the precise moment of their passing the Meridian; but in operations where such instruments are not employed, and where tolerable accuracy can be insured only by taking the average result of several observations, any number of Altitudes may be taken near the Meridian, on each side, from which, by the help of these Tables, the true Meridian Altitudes may be deduced to the same degree of accuracy as if each Altitude had been observed at the instant of Culmination. For this purpose, it is necessary to know the distance (in Time) of the Sun or Star from the Meridian, or the Hour-angles, at the moment of each observation. By knowing the time of Culmination, these Hour-angles will be determined by the Chronometer; and for greater simplicity, its motion should correspond to that of the object observed: That is, if the Sun be the object, the Chronometer should be adjusted to Mean Solar Time; and if a Star be the object, the Chronometer should be adjusted to Sidereal Time. This, however, is not necessary, since a ready correction may be applied so as to reduce the *rate*, either from Mean Solar to Sidereal, or from Sidereal to Mean Solar Time. A further correction will also be necessary in all cases where the

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Chronometer has a gaining or losing rate, on either Mean Solar or Sidereal Time.

Parts I. and II. of the Table, pages 110 and 111, contain the quantities which are to be taken out for each observation, and for which, the *argument* is the hour-angle, or distance from the culminating point, as shown by the Chronometer. Let

A = the Mean of the quantities taken from Part I., or their sum divided by the number of observations.
B = the Mean of the quantities taken from Part II.
L = the Latitude of the place, or the Altitude of the elevated Pole.
D = the Declination of the object observed, *positive* when North, *negative* when South.
z = the Mean of the true Zenith Distances, deduced from the observed Altitudes corrected for instrumental error and Refraction, or their sum divided by the number of observations.
Z = the true Zenith Distance at the moment of Culmination.
r = the *Rate* of the Chronometer expressed in seconds of Time as integers, *positive* when gaining, *negative* when losing.

The expression for the Zenith Distance, in terms of its Declination and of the Latitude, will be different according as the observations are made to the South of the Zenith, or to the North; and in this latter case, according as they are made above or below the Pole. These several values will be as follows:

Z = L — D. .....if the observation be made to the South.
Z = D — L.....if to the North, *above* the Pole.
Z = 180°—(L + D) if to the North, *below* the Pole.

When a star is the object observed and the Chronometer is regulated to

Sidereal Time, Mean Solar Time.

$$a = \left(\frac{\cos L \cos D}{\sin Z}\right) A \qquad a = [0.0023715] \left(\frac{\cos L \cos D}{\sin Z}\right) A$$

$$b = \left(\frac{\cos L \cos D}{\sin Z}\right)^2 B \cot Z$$

$$Z = z \mp (a + b)$$

using under sign when the observations are made to the North below the Pole.

When the Chronometer has a *gaining* or *losing rate*, a must be

Divided by $1 + 0.00002315\, r$, when r is positive, and
Multiplied by $1 + 0.00002315\, r$, when r is negative.

The last column of page 111 (Log. r f) contains the logs of the values of $1+00002315\, r$, arranged so as to be in all cases additive. Taking the *rate* into account, the expressions for a will be, for

Sidereal Time. Mean Solar Time.

$$a = \left(\frac{\cos L \cos D}{\sin Z}\right) A.\, rf \qquad a = [0.0023715] \left(\frac{\cos L \cos D}{\sin Z}\right) A.\, rf$$

In the preceding equations, the Latitude of the place and Declination of the Star, and consequently the Zenith Distance, Z, are supposed to be known; but in cases where the Latitude alone, or the Declination alone, is known, z must be substituted for Z, and then the resulting reduction, which will not differ materially from the true reduction, applied to z, will give Z, and also L, very near the truth: The operations pointed out in the formula can then be repeated as if they had been previously known.

Where the observations are made for the purpose of determining the Latitude, the expression for L in terms of the Zenith Distance and Declination will be different according as the observations are made to the South of the zenith or to the North; and in this latter case, according as the Star is *above* or *below* the Pole. The expression for each case will be

L = Z + D. .....if the observation be made to the South.
L = D — Z.....if to the North, *above* the Pole.
L = 180°—(Z + D) if to the North, *below* the Pole.

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The following example shows the method of proceeding with these observations, and of determining the Error of the Chronometer, whose *Rate* is supposed to be known.

Example:—On October 18, 1841, in West Longitude 4h 31m 7s, and assumed North Latitude 46° 53′ 30″ a series of observations were made on the star *a* Ceti for a correct determination of the Latitude. The Times shown by the Chronometer, the several Hour-angles, and the Altitudes were registered as below. The errors of the Sextants were, of the one used in the observations of *a* Ceti, +20″; of the one used in the observations of *β* Geminorum and *α* Andromeda, —35″. The Chronometer was regulated to Mean Solar Time, and had a daily losing Rate of 2s.7. The Barometer and Thermometers were examined at the commencement of the observations and again when they were completed, for the purpose of obtaining the corrections for Refraction: and for the correct Time, observations were made on the Star *β* Geminorum to the East of the Meridian, and on the Star *α* Andromeda to the West, from which it was found that the Chronometer was 4m 32.8s. slow, which agreed nearly with its time by *Rate*. The data required in reducing the observations will be

	R.A h. m. s.	Dec. — D.		At beginning. in	At ending. in	Means. in	
a Ceti	2 54 2.38	+ 3° 28′ 8″.	Barometer	28.71	28.72	28.72	r—9s.7
β Geminor	7 35 38.83	+28 24 9.	External Therm.	27.3	25.5	26.4	L+46° 53′ 30″
α Androm.	0 0 15.10	+28 13 19.	Internal Therm.	28.0	27.8	27.9	

For Mean Time of Transit of a Ceti.

	h. m. s.
Star's R. A. — Sid. Time of Transit	2 54 2.38
West Longitude	4 31 7
Greenwich Sidereal Time of Transit	7 25 9.38
Correction for 7h. (Table, p. 87)	2 38.193
" " 25m. "	5.904
" " 9s. "	2.975
Preceding Transit of First of Aries diminished by 4m.	10 7 7.24
Greenwich Mean Time of Transit	17 35 3.69
Mean Time of Star's Transit, (Subtract West Longitude.)	13 3 56.69

No. of Obs.	Times by Chronometer. h m s	Hour Angles. m s	Observed Altitudes.	Refractions. ″	Table. Part I. ″	Table. Part II. ″
1	12 44 54.0	14 30.0	46°28′ 25″	55.93	412.67	0.41
2	12 47 18.1	12 5.8	46 29 45	55.88	287.28	0.20
3	12 48 33.7	10 50.2	46 31 25	55.83	230.54	0.13
4	12 51 12.0	8 11.9	46 33 5	55.78	131.90	0.10
5	12 54 23.9	5 0.0	46 34 15	55.74	49.60	0.01
6	12 55 20.4	4 3.5	46 34 45	55.72	32.36	0.00
7	12 57 24.2	1 59.7	46 35 5	55.71	7.79	0.00
8	12 59 20.7	2.2	46 35 15	55.71	0.00	0.00
9	13 1 26.9	2 3.0	46 35 10	55.71	8.25	0.00
10	13 3 15.4	3 51.5	46 34 45	55.72	29.22	0.00
11	13 4 30.4	5 6.5	46 34 25	55.73	51.24	0.01
12	13 5 44.9	6 21.0	46 33 55	55.75	79.17	0.02
13	13 6 45.6	7 21.7	46 33 30	55.77	106.41	0.03
14	13 9 19.7	10 55.8	46 31 20	55.84	234.50	0.14
15	13 12 31.2	13 7.3	46 29 40	55.89	337.94	0.20
16	13 14 53.9	15 30.0	46 27 25	55.96	471.56	0.54
17	13 16 4.0	16 40.1	46 26 15	56.00	545.29	0.72
	Sums		548.25	948.67	3015.21	2.51
	Means		46 32 15.6	55.80	log 3.4793175	log 0.39967
	Error of Sextant		+ 20	log 17	1.2304489	1.23845
	Mean Apparent Altitude		46 33 35.6	log A	2.2488686	log B 9.16922

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	° ′ ″
Mean Apparent Altitude	46 32 35.6
Mean Apparent Zenith Distance	43 27 24.4
Refraction	55.8
True Zenith Distance = z	43 28 20.2

First Determination.

log A	2.2488686
log cos L	9.8346632
log cos D	9.9992036
comp. log sin z	0.1624053
const	0.0023715
log rf	0.0000271
log a	2.2475393
a	0° 2′ 56″.82
b	.15
$a + b$	2 56.97
z	43 28 20.20
Z	43 25 23.23
D	3 28 8.20
L	46 53 31.43

log cos L	9.83466
log cos D	9.99990
comp. log sin z	0.16241
log $\left(\frac{\cos L \cos D}{\sin z}\right)$	9.99627
log $\left(\frac{\cos L \cos D}{\sin z}\right)^2$	9.99254
log B	9.16922
log cot z	0.02316
log b	9.18492

Second Determination.

Using { Z = 43 25 23.23, L = 46 53 31.43 (° ′ ″)

comp. log sin Z	0.1628027
log cos L	9.8346590
log cos D	9.9992036
log A	2.2488686
const	0.0023715
rf	0.0000271
log a	2.2479325
a	0° 2′ 56″.98
b	.15
$a + b$	2 57.13
z	43 28 20.20
Z	43 25 23.07
D	3 28 8.20
True Latitude	46 53 31.27

If the operation be now repeated with Z and L, found by the last determination, it will lead to the same result, which is therefore the true one, according to the accuracy of the observations.

Where the observations do not extend beyond 10^m from the Meridian, the computation of b may generally be omitted.

The corrections for refraction, used in this example, were obtained by adding to the log r corresponding to each Apparent Zenith Distance, (corrected for the error of the Sextant), the constant log derived from the mean state of the Barometer and Thermometers. The error, however, which would have resulted from computing the Refraction for the *Mean* Apparent Zenith Distance only, would have been less than 0″.1.

To explain the method of determining the Error of the Chronometer from an observed Altitude of a Star, let

ε = the Star's True Altitude.
Δ = the Star's North Polar Distance, or 90°—D.
$S = \frac{1}{2}(\varepsilon + \Delta + L)$.
$d = S - \varepsilon$.
h = the Star's Hour-angle.

Then

$$\text{Sin}\left(\tfrac{1}{2} h\right) = \sqrt{\left(\frac{\cos S \sin d}{\sin \Delta \cos L}\right)}$$

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If the Star be observed to the East of the Meridian, h (in *Time*) must be *subtracted* from its Right Ascension; if to the West, it must be *added*: in either case the result will be the Sidereal Time of observation.

For the Error of the Chronometer in the above observations, the mean of several observed Altitudes of β Geminorum to the East of the Meridian, and of α Andromeda to West, with the mean of the corresponding times shown by the Chronometer, were

	β Geminor.	α Androm.	
	h m s	h m s	
Means of Times by Chronometer	13 52 8.78	13 25 4.6	
Means of Observed Altitudes	42°20′ 0″	47°10′ 0″	
Error of Sextant	— .35	— 35	
Apparent Altitudes	42 19 25	47 9 25	
Refractions	1 4.1	54.6	
True Altitudes $= \varepsilon$	42 18 20.9	47 8 30.4	
$90 - D = \Delta$	61 35 51.1	cosec Δ	0.055701
Latitude $= L$	46 53 30	sec L	0.165341
$2S$	150 47 42.0	cos S	9.401593
S	75 23 51	sin d	9.737177
$S - \varepsilon = d$	33 5 30.1		19.359812
	h m s		
Star's Right Ascension	7 35 38.83	sin ($\frac{1}{2}h$)	9.679906
Subtract h in Time	3 48 42.80		$\frac{1}{2}h$ 28°35′21″
Sidereal Time of Observation	3 46 56.03		
Add West Longitude	4 31 7		h 57 10 42
			h m s
Greenwich Sidereal Time of Observation	8 18 3.03	h in Time	3 48 42.80
Correction for 8h (Table, page 87)	2 28.364		
" 18m "	7.051		
" 3s "	2.992		
Preceding Transit of First of Aries — 4m	10 7 7.24		
Greenwich Mean Time of Observation	18 27 48.68		
Subtract West Longitude	4 31 7		
Mean Solar Time of Observation	13 56 41.68		
Time by Chronometer	13 52 8.78		
Chronometer Slow	4 32.90		

If we now compute with the True Altitude of α Andromeda, the Mean Solar Time of observation will result 13h 29m 42s.30, giving for the Error of the Chronometer, 4m. 32s.7 Slow. The mean of these two results was adopted in our example of *Reduction to the Meridian*.

When the Sun is the object observed, it will be necessary to take into account the change of declination during the interval of the observations, and also the difference between *Apparent* Time and that shown by the Chronometer. Another point to be considered is, that the Sun does not attain its greatest Altitude when exactly in the Meridian, but (with the exception of the two days of the Solstices) either a little before or a little after that moment of time, according to its position in the Ecliptic. The difference between its Meridian and greatest Altitudes will also vary in different Latitudes. Instead, therefore, of taking out the declination for Apparent Noon, or when the Sun's centre is in the Meridian, we must take it for the instant the Sun reaches its greatest Altitude. Denoting the difference between this instant and Apparent Noon by t, we shall have

$$t = [7.7947]\ \delta t\ \frac{\sin\ (L - D)}{\cos L \cos D}$$

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In this equation δ_1 is the Sun's double daily variation in seconds, positive when towards North, negative when towards South. (Log δ_1 from the Solar Ephemeris). Approximate values only, of L and D, are required in the computation of t. Example: Required the time of the Sun's greatest altitude September 29, 1845, in Latitude 46° 54′ N.

		° ′
From Solar Ephemeris, p. 42	L	+ 46 54
	D	— 2 27
	L—D	+ 49 21
	const	7 7247
From Solar Ephemeris, p. 42	log δ_1	— 3.4481
	log sin (L—D)	+ 9.8901
	comp log cos L	+ 0.1654
	comp log cos D	+ 0.0004
	log t	— 1.2187
	t	— 13.2

which, applied to Apparent Noon, gives $23^h\ 59^m\ 46^s.8$ for the Apparent Time to which the observations are to be referred.

The correction for the change in Declination during the observations will be

$$-[4.0635]\,\delta_1\,\frac{E-W}{n}$$

in which

E = the Sum of the Hour-angles observed to the East, and
W = the Sum of the Hour-angles observed to the West of the Meridian.
n = the number of observations.

The correction required on account of the difference between Apparent Time and that shown by the Chronometer, will be most conveniently obtained by applying the daily variation in the Equation of Time to the *rate*. Denoting this variation by v, it will be positive or negative according as the Equation is to be added to or subtracted from Apparent Time, and according as it is increasing or decreasing. It will be

Positive when the Equation is to be added and is increasing,
Negative when the Equation is to be added and is decreasing,
Negative when the Equation is to be subtracted and is increasing,
Positive when the Equation is to be subtracted and is decreasing.

Applying v to the *rate*, log rf must be taken out with $r+v$ as argument. The reduction to the Sun's culminating point will be, when the Chronometer is regulated to

Mean Solar Time. $a = \left(\frac{\cos L \cos D}{\sin Z}\right) A.\ rf$

Sidereal Time. $a = [9.9976285]\left(\frac{\cos L \cos D}{\sin Z}\right) A.\ rf$

$$b = \left(\frac{\cos L \cos D}{\sin Z}\right)^2 B \cot Z$$

$$Z = z \mp \left\{ a + b - [4.0635]\,\delta_1 \left(\frac{E-W}{n}\right) \right\}$$

using under sign when the observations are made to the North below the Pole.

The employment of the Sun's greatest Altitude instead of its Meridian Altitude, was suggested by M. Gauss; and, though slightly inaccurate in theory, it is simple and convenient in practice, and will generally be found preferable to any other.

For determining Altitudes with the Barometer. (Pages 112 to 115.)

These Tables, with the exception of the one on page 115, were constructed from those given by Bessel in the *Astronomische Nachrichten*, published by Schumacher. The Table given on page 115 is from one published by Bailey in his *Astronomical Tables and Formulæ*.

In using Bessel's Tables for observations where the correction depending on the state of the atmosphere with respect to moisture is not taken into account, the first five tables only are employed. To obtain this correction, it must be computed by the formula given with the Table VI., page 114, as in the following examples.

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Example 1. The wet bulb Thermometer (Centigrade) indicated $+5^{\circ}.4$; the dry bulb $+7^{\circ}.7$. The height of the Barometer, reduced to the temperature of melting ice, was 30.116 inches: Required the value of a.

$(b) =$	30.116
$\theta_1 = +$	$5^{\circ}.4$
$\theta = +$	7 .6
$\theta - \theta_1 = +$	2 .3

(Tab. VI. arg. $+5.4$)	log. $f\,\theta_1$	0.1492	(Tab. VI. arg. $+5^{\circ}.4$)	log. $\psi\,\theta_1$	6.4387
(Tab. VI. arg. $+7.7$)	log. $f\,\theta$	0.2117		log. A	9.9375
				log. $(\theta - \theta_1)$	0.3617
	log. A	9.9375		log. (b)	1.4788
				const.	1.0515
	A	0.8660			
	B	0.1854		log. B	9.2668
	a	0.6806			

Example 2. The wet bulb Thermometer (Centigrade) with a covering of ice, indicated $-0^{\circ}.2$, the other $+0.9$. The height of the Barometer referred to the temperature of melting ice, was 327.3, Paris Lines. Required the value of a.

$(b) =$ 327.3	log. $f\,\theta_1$	0.0056	log. $\psi\,\theta_1$ 6.5416
$\theta_1 = -$ $0^{\circ}.2$	log. $f\,\theta$	0.0251	log. A 9.9705
$\theta = +$ 0 .9	log. A	9.9705	log. $(\theta - \theta_1)$ 0.0414
$\theta - \theta_1 = +$ 1 .1	A	0.934	log. (b) 2.5150
	B	0.117	log. B 9.0685
	a	0.817	

The method of computing the difference of Altitudes between two points from Barometric observations, is as follows, where the letters with an accent refer to the upper station.

Let b, b' = the height of the Barometer.
t, t' = the height of the Thermometer (*Fahrenheit or Centigrade*) attached to the Barometer.
τ, τ' = the height of the Thermometer (*Fahrenheit or Centigrade*) in the open air.
a, a' = the degree of saturation of the air with moisture.
h, h' = the height of the Station above the sea in feet.
ϕ = the Latitude of the place.

Then if the Barometers read on scales divided into Paris Lines

$$\log \beta = \log b + \log tf$$
$$\log \beta' = \log b' + \log t'f$$

If the Barometers read on scales divided into English inches

$$\log \beta = \log b + [1.05153] + \log tf$$
$$\log \beta' = \log b' + [1.05153] + \log t'f$$

Log tf is to be taken out from Table II, with *argument* t (*Fahrenheit or Centigrade*), and log $t'f$ with argument t'.

$$B = \log (\log \beta - \log \beta')$$

From Table I, take out logs V and W, with the *argument* $\tau + \tau'$.

Compute
$$\log \left\{ \frac{W\,(a + a')}{\sqrt{(\beta\beta')}} \right\}$$

And with this as *argument*, take out log V′ from Table III. The numbers of this Table are units of the 5th decimal of the logarithm. Thus, against 7.55 is the number 154, which is to be taken out 0.00154. If the atmospheric moisture is not taken into account, that is, if we suppose the atmosphere to be in its mean state of saturation, $a + a' = 1$, and the argument becomes

$$\log \left\{ \frac{W}{\sqrt{(\beta\,\beta')}} \right\}$$

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With *argument* ϕ, take out log G from Table IV.
Then, for the approximate difference of altitudes,

$$\log (h' - h) = \log B + \log V + \log V' + \log G.$$

With h' as *argument*, take out the corresponding number from Table V, giving it the positive sign; and with h as *argument*, take out the corresponding number, giving it the *negative* sign; then adding these numbers to the approximate difference, the sum will be the true difference of Altitudes between the two Stations.

Example. At a point whose Altitude above sea-level is 1444.6 feet, and on Mount Gregorio, the following observations were made by d'Aubuisson with a Barometer and Centigrade Thermometer. The reading of the Barometer was in Paris Lines. As the temperature of the dew-point was not ascertained, we will suppose the atmosphere to have been in a mean state of saturation with moisture, or $a = a' = \frac{1}{2}$, and $a + a' = 1$. The Latitude was 45° 32′.

L	°	°	
$b = 329.013$	$t = +19.85$	$\tau = +19.95$	$h = 1444.6$ feet.
$b' = 268.215$	$t' = +10.5$	$\tau' = +9.9$	

	$\log b$ 2.51721		$\log b'$ 2.42848
Table II. (arg. + 19.85)	$\log tf$ 9.99862	Table II. (arg. + 10°.5)	$\log tf$ 9.99926
	$\log \beta$ 2.51583		$\log \beta'$ 2.42774
	$\log \beta'$ 2.42774		$\log \beta$ 2.51583
	B 0.08809		4.94357
	$\log B$ 8.94493		$\sqrt{(\beta\beta')}$ 2.4718
Tab. I. (arg $\tau + \tau' = +39.85$)	$\log V$ 3.99782	Table I. (arg. + 29°.85)	$\log W$ 0.0397
Table III. (arg. 7.558)	$\log V'$ 0.00161		$\log \left\{ \frac{W}{\sqrt{(\beta\beta')}} \right\}$ 7.5679
Table IV. (arg. $\phi = 45° 32'$)	$\log G$ 0.80582		
	$\log$ 3.75018	Approx. diff. of Altitudes	5625f.8
Approx. difference of Altitudes	5625f.8	Table V (arg. 7000f.)	+ 2.3
	h 1444.6	" (" 1400)	− 0.1
		True diff. of Altitudes	5628.0
Approximate h'	7070.4		h 1444.6
		True height of Upper Station above Sea-level	7072.6

If, in this example, we suppose the atmosphere perfectly dry, $a + a' = 0$, and the log of V' vanishes, which gives the difference of altitudes 20.7f. less. If we suppose the air fully saturated, $a = 1$, $a' = 1$, $a + a' = 2$, which gives the difference 21.0f. more.

Example 2. The following observations were made at two Stations in Latitude 48, the lower of which was 639.5 feet above the sea. The atmosphere was supposed to be in a mean condition with respect to moisture.

°	inch.	°	°
$\phi = 48$	$b = 28.089$	$t = +33.1$ (Fah.)	$\tau = +32.7$ (Fah.)
$h = 639.5$f.	$b' = 25.447$	$t' = +28.2$ "	$\tau' = +27.7$ "
			$\tau + \tau' = +60.4$

	$\log b$ 1.44853		$\log b'$ 1.40564
	const. 1.05153		const. 1.05153
Table II.	$\log tf$ 9.99995,5		$\log t'f$ 0.00015,3
	$\log \beta$ 2.50001,5		$\log \beta'$ 2.45732,3
	$\log \beta'$ 2.45732,3		$\log \beta'$ 2.50001,5
	B 0.04269,2		4.95734
	$\log B$ 8.63035		2.4797
Table I.	$\log V$ 3.97247		$\log W$ 9.6079
Table III.	$\log V'$ 0.00059		$\left\{ \frac{W}{\sqrt{(\beta\beta')}} \right\}$ 7.1282
	$\log G$ 0.80579		
Log of the approx. diff.	3.46913		

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Example—(continued.)

Approx. diff.	2565.3	Approx. diff.	2565.3
h	639.5	Tab. V. (arg. h^1)	+0.45
		" (arg. h)	−0.00
	3204.8	True diff. of Altitudes	2565.75
		h	639.5
		True height of Upper Station above sea-level	3205.25

After these examples the method of working by Mr. Bailey's Table (page 101) will be readily understood from the formula given on the same page.

Semi-Diurnal Arcs. (Pages 102 and 103.)

This Table is useful for determining the *Rising* and *Setting* of the heavenly bodies. The arguments for taking out the tabular numbers are the Declination of the object at the top of the table, and the latitude of the place at the side. These numbers represent, for North Latitudes, half the time which the object remains above the horizon, and are to be subtracted from the time of Meridian Passage for *Rising*, and added to the time of Meridian Passage for *Setting*, as in the following examples:

Required the Mean Time of *Setting* of the Planet Venus, May 9, 1844, at Philadelphia, Lat. 40° ?

	h.	m.
Meridian Passage May 9th, (Page 49)	3	9
Semi-Diurnal Arc for Lat. 40° and Dec. 26°.5 N. (page 102)	7	39
Venus sets May 9th	10	48

Required the Mean Time of Rising of the Planet Saturn, June 23d, 1844, at New York; Lat. 41° ?

	h.	m.
Meridian Passage, June 23d	14	25
Semi-Diurnal Arc for Lat. 41° and Dec. 19°.8 S. (Page 103)	4	50
Saturn Rises June 23d	9	35

Right Ascension in Arc into Mean Solar Time. (Page 104.)

When time is deduced from observations of a Star out of the Meridian, its *hour-angle*, determined from its altitude, applied to its Right Ascension, (with the *positive* sign if observed to the West of the Meridian, with the *negative* sign if to the East), will give the Sidereal Time of observation. If mean time is required, considerable labour will be avoided by the use of the present table in connexion with the Mean Time of Sidereal Noon, and the constants given with the places of the *Fixed Stars*; for we have only to apply the Star's hour-angle, reduced by this table, to the Mean Time of its transit. The rule, then, will be,—Add the constant for the Star (corrected for the meridian of the place), and the given seconds of its Right Ascension, to the preceding Greenwich Sidereal Noon; and to the sum add the Star's *reduced* hour-angle according to its sign. For correcting the Star's constant, see page 294.

Example. Suppose an observation to be made on the Star α Aquilæ, at the Philadelphia High School Observatory, August 20th, 1844; and that the hour-angle, deduced from its altitude, is + 57° 32′ 56″, the Star being to the West of the Meridian; required the Mean Solar Time of observation?

	h.	m.	s.		h.	m.	s.
Preceding Sid. Noon Aug. 19th	14	5	57.05	Equivalent for 57° (page 104)	3	47	22.647
Constant for α Aquilæ (p. 66).	19	38	56.90	" 32′ "		2	7.650
Seconds of R. A. Aug. 20th...			14.28	" 56″ "			3.720
Mean Time of Transit	9	45	8.23	Hour-angle reduced	3	49	34.02
				Mean Time of Transit	9	45	8.23
				Mean Time of observation ..	13	34	42.23

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Mean Solar Time into Right Ascension in Arc. (Page 119.)

This table will be found useful in many computations, for converting into degrees, &c., a Star's hour-angle, as measured by a clock or chronometer adjusted to Mean Solar Time. For example,—a Star passes the Meridian at 2h. 50m. 21.96s. Mean Time, and the time of observation is 7h. 42m. 49.07s. Required the Star's hour-angle, or distance from the Meridian?

	h. m. s.			° ′ ″
Mean Time of Transit,...	2 50 21.96	Equivalent for 4h. (page 119).....		60 9 51.30
Mean Time of observation,	7 42 49.07	" 52m. "	.....	13 2 8.13
		" 27s. "	....	6 46.11
Hour-angle in Mean Time.	4 53.27 11	" 0.11s. "	....	1.65
		Hour angle required,.....		73 18 47.3

Logarithms of Numbers, from 10 *to* 1000. (Pages 120 and 121.)

This and the following tables, *antilogarithms*, and *sines* and *tangents*, will be found very convenient for computing occultations, and for a great many calculations where the required accuracy can be obtained by using logs to form decimal places.

With the column of small arcs given in the argument for the logarithms of numbers, most of the required reduction to seconds will be avoided. In using this column the index of the logarithms will be 2, the units of seconds being in the third place of numbers, and found at the top of the table. The proportional parts of the logarithms will then be for tenths of seconds. Example:

For the log. 3′ 43″ .8;—we have against 3′ 40″ at the side, and under 3 at top .2463
And in the proportional parts under 8..... 15

And for the log. of 3′ 43″.8..... 2.3498

Antilogarithms. (Pages 122 and 123.)

By this table, numbers corresponding to give logarithms may be taken out, correct to the third place, and excepting the higher numbers near the end of the table, to the fourth. The required number will be found with the two first figures of the logarithms at the side, the third at top; and if greater precision is desired, a proportional part, found with the fourth figure at top, must be added. For example, required the number corresponding to the logarithm 2.9656?

With 96 at the side and 5 at the top, we have 922.6
Proportional part with 9 at top..... 1.3

Numbers corresponding to 2.9589 ..... 923.9

Logarithms of Sines and Tangents. (Pages 124 to 127.)

In this table the log. sines and tangents for the first five degrees are given to every minute, and for the remaining degrees of the quadrant, to every tenth minute. Example required the log. tangent of 7° 48′?

The log. tangent of 7° 40′ is 9.1291; the diff. for 10′ is 94; multiplying this by 8 and rejecting the right hand figure, we have 75, which added to 9.1291, gives 9.1366 for the tangent of 7° 48′. Required the arc corresponding to the log tangent 9.1366? The next less log tangent given in the table is 9.1291, corresponding to 7° 40′: the difference is 75: dividing this by 94, we have .8 or 8′ which applied to 7° 40′ gives 7° 48′. As the multiplication and division can be performed mentally, this table will be of great advantage in numerous computations where rigorous accuracy is not required.

Decimals of an Hour. (Page 128.)

This table is useful for converting minutes and seconds into decimals of an hour, whenever quantities are to be computed for any given time from the Ephe-

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merides, by means of *differences for* 1 *hour*. The decimal values stand against their respective minutes and seconds in the proper column. Example: Required the value of 44 minutes 39 seconds, in decimals of an hour.

Against 44m. we have	.73333
And against 39s.....	.01083
Decimal required	.7442

Quantities depending on the figure of the Earth. (Page 128.)

In the computation of Eclipses and Occultations, the Moon's parallax requires a correction on account of the diminution of the Earth's radius in proceeding toward the poles. The correction, therefore, must depend on the latitude of the place.

Let ϕ = the Latitude of the place, and $\phi' = \phi$ diminished by the *angle of the vertical*. Then

$$r \sin \phi' = A \sin \phi$$
$$r \cos \phi' = B \cos \phi$$

which are the circular functions for the latitude, used in the computations, and which are obtained more conveniently in this way, than by the usual method of obtaining ϕ' by subtracting the angle of the vertical, than taking out the required functions and adding log r.

Example.—Required log $r \sin \phi'$ and log $r \cos \phi'$ for the Latitude of Halifax, Nova Scotia. The Latitude given in page 133 for Halifax $44° 39' 20'' = \phi$.

log A for 44°	4.9978601	log B for 44°	0.0006789
Proportion part for 39′ 20″	161		161
log A	9.9978762	log B	0.0006950
log sin ϕ	9.8468584	log cos ϕ	9.8526809
log r sin ϕ'	9.8447346	log r cos ϕ'	9.8527752

The quantities in the present table, angle of the vertical, log r, log A. and log B. have been computed for this work from an assumed compression of 0.00324. To obtain them for any other compression, let

c = assumed compression
$\gamma = 1 - c$
e = eccentricity of the Earth's Meridian = $\sqrt{(1-\gamma^2)}$

then,

$$A = \frac{(1 - ce)}{\sqrt{(1 - ce \sin^2 \phi)}} \qquad B = \frac{A}{(1 - ce)}$$

$$\tan \phi' = (1 - ce) \tan \phi \quad \text{angle of the vertical} = \phi - \phi' \quad r = \frac{A \sin \phi}{\sin \phi'} = \frac{B \cos \phi}{\cos \phi'}$$

Lunar Distances. (Pages 50 to 58.)

These pages contain, for every third hour of Greenwich Mean Time, the angular distances between the apparent *centres* of the Moon and certain heavenly bodies, such as they would appear to an observer at the centre of the Earth. When a Lunar Distance has been observed on the surface of the Earth, and reduced to the centre, by clearing it of the effects of parallax and refraction, the numbers in these pages enable us to ascertain the exact Greenwich mean time at which the objects would have the same distance.

The columns headed "P. L.," contain the Proportional Logarithms of the Differences of the distances at intervals of three hours, which are used in finding the Greenwich time corresponding to a given distance, according to the following rule, viz: For the given day, seek in the Ephemeris, for the *nearest* distance *preceding*, in order of time, the given distance, and take the difference between it and the given distance; from the proportional logarithm of this difference subtract the proportional logarithm standing opposite to the said *nearest* distance in the Ephemeris; the remainder will be the proportional logarithm of a portion of time to be

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added to the hour answering to the *nearest* distance, to obtain the approximate Greenwich mean time corresponding to the given distance.

If the distance between the Moon and a star increased or decreased uniformly, the Greenwich time corresponding to a given distance, as found by the above rule, would be strictly correct; but an inspection of the columns of the Proportional Logarithms in the Ephemeris will show that this is not the case; and as the knowledge of the exact Greenwich time is desirable, a correction must be applied to the time so found for the variation of the differences of the distances. This correction may be obtained by means of the Table at page 129, in the following manner:—

1. Find the Approximate interval by the preceding rule.
2. Take the differences between the proportional logarithms standing opposite to the distances in the Ephemeris which include the given distance.
3. With the approximate interval and this difference, as arguments, take out the correction from the table.
4. If the Proportional Logarithms are *decreasing*, *add* the correction to the approximate time; but if *increasing*, *subtract* it: the result will be the accurate Greenwich mean time.

Example. Required the Greenwich Mean Time, at which the *true* or *reduced* distance between the Moon and Jupiter would be 15° 10′ 38″ on September 17, 1845. It appears, by inspecting the distances, that the time must be between 18h. and 21h: the nearest distance *preceding* the given distance, in order of time, is therefore

	° ′ ″	
Distance at 18h.	15 48 45	P. L. 0.2585
Reduced distance	15 10 38	
Difference	38 7	P. L. 0.6742
Approximate Interval	1 9 7	P. L. 0.4157

The difference between the Proportional Logarithms in the Ephemeris, at 18h. and 21h., is 27. Opposite to 1h. 9m., (or the quantity nearest to it, 1h. 10m.,) and under 27, in the table page 129, we have the correction 8s, which, *subtracted* from the Approximate Interval, 1h. 9m. 7s., because the Proportional Logarithms are *increasing*, gives 1h. 8m. 59s, for the true interval from 18h.: and hence the Greenwich Mean Time is 19h. 8m. 59s.

Working a Lunar.

The following modification of Borda's method of determining the *true* from an observed distance between the Moon and the Sun, or a Star, or as it is technically called, *working a Lunar*, is from *Encke's Astronomisches Jarbuch*, for 1842.

d = Apparent Distance
H = Moon's Apparent Altitude
h = Sun's Apparent Altitude
P = Moon's Horizontal Parallax
p = Sun's Horizontal Parallax
S = Moon's Horizontal Semidiameter
s = Sun's Semidiameter
R = Refraction for Moon's Altitude
A = Observed Altitude of Moon's limb

d' = True Distance
H' = Moon's True Altitude
h' = Sun's True Altitude
P' = Moon's Parallax in Altitude
p' = Sun's Parallax in Altitude
S' = Moon's augmented Semidiameter
D = Observed Distance
r = Refraction for Sun's Altitude
a = Observed Altitude of Sun's limb

$$S = [9.43537]\, P \qquad S' = S + \text{augmentation.}$$
$$H = A \pm S' \qquad h = a \pm s$$
$$P' = P \cos H \qquad p' = p \cos h$$
$$H' = H + (P' - R) \qquad h' = h - (r - p')$$
$$d = D \pm S' \pm s$$

For a Star or a Planet.

$$h' = h - r \qquad d = D \pm S'$$

$$\sin^2 C = \frac{\cos h' \cos H'}{\cos h \cos H} \cos \tfrac{1}{2}(h + H + d) \cos \tfrac{1}{2}(h + H - d)$$
$$\sin^2 \tfrac{1}{2} d' = \cos(\tfrac{1}{2}[h' + H'] + c) \cos(\tfrac{1}{2}[h' + H'] - C)$$

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In the equations for H and h, use upper sign for an observed altitude of the upper limb: under sign for lower limb. For d, use upper sign for nearest limb; under sign for farthest limb. Omitting a, p, p', and s, use the same symbols for a star or planet as those given for the sun. The augmentation is to be taken from the folowing table with the arguments S and H.

Augmentation of the Moon's Semidiameter.

	SEMIDIAMETER.							SEMIDIAMETER.							SEMIDIAMETER.					
	14′	15′		16′		17′		14′	15′		16′		17′		14′	15′		16′		17′
H	30″	0″	30″	0″	30″	0″	H	0″	0″	30″	0	30″	0″	H	0″	0″	30″	0″	30″	0″
°	″	″	″	″	″	″	°	″	″	″	″	″	″	°	″	″	″	″	″	″
0	0.1	0.1	0.1	0.1	0.1	0.1	18	4.3	4.6	4.9	5.2	5.5	5.9	45	9.7	10.3	11.0	11.8	12.5	13.3
2	0.6	0.6	0.7	0.7	0.8	0.8	21	4.9	5.3	5.7	6.0	6.4	6.7	48	10.2	10.9	11.6	12.4	13.1	14.0
4	1.0	1.1	1.2	1.3	1.4	1.5	24	5.6	6.0	6.4	6.8	7.2	7.7	51	10.6	11.3	12.1	12.9	13.7	14.6
6	1.5	1.6	1.7	1.9	2.0	2.1	27	6.2	6.7	7.2	7.6	8.1	8.6	54	11.1	11.8	12.6	13.5	14.2	15.2
8	2.0	2.1	2.2	2.4	2.5	2.7	30	6.9	7.4	9.9	8.4	8.9	9.4	57	11.5	12.3	13.1	14.0	14.8	5.7
10	2.4	2.7	2.8	3.0	3.2	3.3	33	7.5	8.0	8.6	9.1	9.6	10.3	63	12.2	13.0	13.9	14.8	15.7	16.7
12	2.9	3.2	3.3	3.5	3.7	4.0	36	8.0	8.6	9.2	9.8	10.4	11.1	70	12.7	13.7	14.7	15.7	16.6	17.6
14	3.4	3.6	3.8	4.1	4.4	4.6	39	8.6	9.2	9.9	10.5	11.1	11.8	78	13.3	14.3	15.3	16.3	17.3	18.4
16	3.9	4.1	4.4	4.7	5.0	5.2	42	9.1	9.8	10.4	11.2	11.8	12.6	90	13.5	14.6	15.6	16.7	17.6	18.6

EXAMPLE.

On April 29, 1838, at 4h. 5m. 56s., an observation was made by Mr. William H. C. Riggs, of Philadelphia, on the distance between the nearest limbs of the Moon and Sun. The observed distance and altitudes (corrected for the error of the sextant,) with the data from the Ephemeris, were as follows:

		° ′ ″			′ ″
Observed Distance	D	70 23 22	Moon's Horizontal Parallax	P	55 40.6
Altitude of Moon's lower limb	A	72 34 21	Sun's Horizontal Parallax	p	8.6
Altitude of Sun's lower limb	a	30 22 22	Sun's Horizontal Semidiameter	s	15 53.4

The West Longitude of the place, as determined from former observations, was 5h. 0m. 40s.: Required the Longitude from this observation.

		log P	3.52382			a	30 22 22
		const	9.43537			s	15 53.4
		log S	2.95919			h	30 38 15.4
		S	15′10″.3			log cos h	9.93 5
Augmentation,			14 .3			log p	0.93 4
		S'	15 24 .6			log p'	0.86 9
		A	72°34 21			p'	7″.4
		H	72 49 45 .6			r	1 32.8
		log cos H	9.47014			$r - p'$	1 25.4
log P cos H	·	log P'	2.99396	$h-(r-p')$	· ·	h'	30 36 50.0
		P'	16′26″.2			D	70 23 22
		R	18.8			S'	15 24.6
		$P' - R$	16 7.4			s	15 53.4
$H + (P' - R)$	·	H'	73 5 53.0	$D + S' + s$	· ·	d	70 54 40.0

	° ′ ″		
h	30 38 15.4	log cos h'	9.9348107
H	72 49 45.6	log cos H'	9.4634968
$h + H$	103 28 1.0	comp. log cos h	0.0652957
d	70 54 40.0	comp. log cos H	0.5298558
$h + H + d$	174 22 41.0	log cos $\frac{1}{2}(h + H + d)$	8.6905596
$h + H - d$	32 33 21.0	log cos $\frac{1}{2}(h + H - d)$	9.9892321
$\frac{1}{2}(h + H + d)$	87 11 20.5	log sin² C	8.6662507
$\frac{1}{2}(h + H - d)$	16 16 40.5	log sin C	9.3331254
h'	30 36 50.0		
H'	73 5 53.0	log cos $(\frac{1}{2}[h' + H'] + C)$	9.6372840
$h' + H'$	103 42 43.0	log cos $(\frac{1}{2}[h' + H'] - C)$	9.8879018
$\frac{1}{2}[h' + H']$	51 51 21.5	log sin² $\frac{1}{2}d'$	$\overline{9}$ 5251858
C	12 26 7.5	log sin $\frac{1}{2}d'$	9.7625929
$\frac{1}{2}[h' + H'] + C$	64 17 29.0	$\frac{1}{2}d'$	35°22′20″.0
$\frac{1}{2}[h' + H'] - C$	39 25 14.0	True Distance d'	70 44 40.0

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By the Ephemeris for 1838, it is found that the nearest distance preceding this reduced distance was at 9h., Greenwich Mean Time.

	° ′ ″	
Distance at 9h.	70 41 30	P. L. 0.3194
Reduced Distance	70 44 40	
Difference	3 10	P. L. 1.7524
	m. s.	
Approximate Interval	6 38	P. L. 1.4330
Correction for *increasing* Proportional log	— 1	
	h	
Greenwich Mean Time	9 6 37	
Mean Time of Observation	4 5 56	
West Longitude by this Observation	5 0 41	
West Longitude by former observations	5 0 40	
Difference	1	

Computation of Solar Eclipses.

A method of Computing Solar Eclipses, based on that of Professor Besse, was furnished by Mr. Sears C. Walker, of Philadelphia, for the United States Almanac for 1843, the publication of which has been unavoidably deferred to the present volume. As Mr. Walker's paper would occupy more space than we can devote to it, an abstract only is given, which will be found sufficient for the accurate computation of the times of the phases and the magnitude of the Eclipse.

The elements requited for the calculations are—

α = Moon's Right Ascension. α' = Sun's Right Ascension.
δ = Moon's Declination. δ' = Sun's Declination.
π = Moon's Equatorial Horizontal Parallax. log. r = log of Earth's Radius Vector.

These are to be obtained from the Ephemeris for seven or eight full hours. (mean solar time at the place for which the Ephemeris is computed,) taken so that the middle of the whole interval is near the time of true conjunction or *New Moon.*

From these elements the quantities A, d, X, Y, Z, log I, L, log i, l, which are independent of geographical position, may be computed by the following equations.

$$m = \frac{[5.6189407]}{r \sin \pi}$$

$$g = 1 - m \qquad k = 0.2725$$
$$A = \alpha' - m(\alpha - \alpha') \qquad d = \delta' - m(\delta - \delta')$$

$$X = \frac{\cos \delta \sin (\alpha - A)}{\sin \pi}$$

$$Y = \frac{\sin (\delta - d)}{\sin \pi} + X \tan \tfrac{1}{2}(\alpha - A) \sin d$$

$$Z = \frac{\cos (\delta - d)}{\sin \pi} - X \tan \tfrac{1}{2}(\alpha - A) \cos d$$

For External Contact.

$$\sin F = \frac{[7.6693063]}{r g}$$
$$L = Z \tan F + k \sec F$$
$$I = \tan F$$

For Internal Contact.

$$\sin f = \frac{[7.6671936]}{r g}$$
$$l = Z \tan f - k \sec f$$
$$i = \tan f$$

The mode of proceeding with these equations is shown in the following example from the work of the Solar Eclipse of May 5, 1845. For this Eclipse the elements were taken out for each full hour from May 5d 19h to May 6d 1 h, Greenwich Mean Time, giving an interval which includes the whole duration of the Eclipse. The example gives the computation for May 5d 20 h.

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		h. m. s.
α		2 47 40.96
α'		2 52 35.52
$\alpha - \alpha'$	—	4 54.56
		° ′ ″
δ	+	17 13 3.9
δ'	+	16 31 45.0
$\delta - \delta'$	+	41 18.9
π		54 58.9
$\log r$		0.0041236
$\log \sin \pi$	+	8.2039296
$\log r \sin \pi$	+	8.2080532
const		5.6189407
$\log m$	+	7.4108875
$\log (\alpha - \alpha')$	—	2.46917
$\log m (\alpha - \alpha')$	—	9.88006
		h. m. s.
$m (\alpha - \alpha')$	—	0 0 0.76
α'		2 52 35.52
A		2 52 36.28
α		2 47 40.96
in *Time* . . . $\alpha - A$	—	4 55.32
in *Arc* . . . $\alpha - A$	—	1 13 49.8
$\frac{1}{2}(\alpha - A)$	—	36 54.9
$\log (\delta - \delta')$	+	3.39426
$\log m (\delta - \delta')$	+	0.80515
		° ′ ″
$m (\delta - \delta')$	+	0 0 6.4
δ'	+	16 31 45.0
δ	+	16 31 38.6
δ	+	17 13 3.9
$\delta - d$	+	41 25.3
$1 - m$ . . . . . g		0.9974243
$\log g$		9.9988799
$\log r g$		0.0030035
$\log \cos \delta$	+	9.9600883
$\log \sin (\alpha - A)$	—	8.3319158
$\log \operatorname{cosec} \pi$	+	1.7960704
$\log X$	—	0.1080745
X	—	1.28255

$\log X$	—	0.10807
$\log \tan \frac{1}{2}(\alpha - A)$	—	8.03092
$\log X \tan \frac{1}{2}(\alpha - A)$	+	8.13899
$\log \sin d$	+	9.45404
$\log X \tan \frac{1}{2}(\alpha - A) \sin d$	+	7.59303
$\log \sin (\delta - d)$	+	8.0809431
$\log \operatorname{cosec} \pi$	+	1.7960704
$\log \sin (\delta - d) \operatorname{cosec} \pi$	+	9.8770135
$\sin (\delta - d) \operatorname{cosec} \pi$	+	0.75338
$X \tan \frac{1}{2}(\alpha - A') \sin d$	+	0.00392
Y	+	0.75730
$\log \cos d$	+	9.98168
$\log X \tan \frac{1}{2}(\alpha - A) \cos d$	+	8.12067
$\log \cos (\delta - d)$	+	9.9999685
$\log \cos (\delta - d) \operatorname{cosec} \pi$	+	1.7960389
$\cos (\delta - d) \operatorname{cosec} \pi$	+	62.52267
$X \tan \frac{1}{2}(\alpha - A) \cos d$	+	0.01320
Z	+	62.50967
const		7.6693603
$\log r g$		0.0030035
$\log \sin F$	+	7.6663568
$\log \sec F$	+	0.0000031
$\log \tan F$ . . . $\log I$		7.6663599
$\log k$		9.4353665
$\log k \sec F$	+	9.4353696
$\log Z$	+	1.7959472
$\log Z \tan F$	+	9.4693071
$Z \tan F$	+	0.289939
$k \sec F$	+	0.272502
L		0.562441
const		7.6671936
$\log \sin f$	+	7.6641931
$\log \sec f$	+	0.0000030
$\log \tan f$ . . . . $\log i$		7.6641931
$\log k \sec f$	+	9.4353726
$\log Z \tan f$	+	9.4701403
$Z \tan f$	+	0.288496
$k \sec f$	+	0.272504
l	+	0.015992

Take from the Ephemeris the Sidereal Time corresponding to the full hours, and denoting it by σ, compute

$$H = \sigma - A$$

which is the Hour-angle of the point A at the meridian of the place for which the Ephemeris is computed. Also compute

$$\log C = 4.7323940 + [4.9030900](147''84 - \Delta A)$$
$$\log \lambda = \log C \sin 1'' = \log [4.6855749] C$$

in which ΔA is the hourly variation of A.

When the quantities are completed by computing for all the full hours, a comparison by means of differences will test their accuracy and give their hourly variations. If it is the purpose of the computer to determine the Phases, etc. of the Eclipse, for a great number of places widely situated throughout the area of the Earth's surface where it is visible, it will be well to interpolate the co-ordinates X, Y, for intervals of ten minutes, and arrange them, with the other quantities, as in the table on page 93, where ΔX and ΔY are the *hourly* variations of X and Y.

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Computation for a particular place.

Let ω = the Longitude of the place from the Meridian for which the Ephemeris is computed,—East Longitudes positive,—West Longitudes negative.
ϕ = the Latitude of the place,—North Latitudes positive,—South Latitudes negative.
ϕ = the Latitude diminished by the *angle of the vertical.*

$$r \sin \phi' = A \sin \phi$$
$$r \cos \phi' = B \cos \phi$$

The logs of A and B are given in page 128.

Assume for an approximate computation, a time T, near the time of apparent conjunction. This may be found near enough for the purpose by computing

$$h = H + \omega$$

$$\sigma = \frac{\Delta X \cos d}{\cos \phi} \qquad \sigma_1 = [9.4027] \cos h$$

$$t \text{ in minutes} = [1.7782] \begin{matrix} \sin h \\ \sigma - \sigma_1 \end{matrix}$$

t being the interval to be applied to the time of *true* conjunction, or the time when $X = 0$, to obtain the time of apparent conjunction $= T$.

From the table of co-ordinates, etc., take out the values of X, Y, Δx, Δy, H, d, log I, L, log i, l, corresponding to the time T. Also take log λ and k sec f. Then

$$p = X \qquad p' = \Delta X$$
$$q = Y \qquad q' = \Delta Y$$
$$h = H + \omega$$

$$\xi = r \sin \phi' \cos d \qquad \eta = \xi - \beta \xi$$
$$\zeta = r \cos \phi' \sin h \qquad \zeta' = \lambda \zeta \cot h$$
$$\beta = \sin d \cot h \qquad \eta' = \lambda \xi \sin d$$

$$\rho = \xi \tan d + \beta \xi \cot d$$
$$K = L - I\rho \qquad k = l - i\rho$$

$$m \sin M = p - \zeta \qquad n \sin N = p' - \zeta'$$
$$m \cos M = q - \eta \qquad n \cos N = q' - \eta'$$

$$W = -\frac{m}{n} \qquad u = W \cos (M - N)$$

For External Contact.

$$\cos \psi = \frac{m \sin (M - N)}{K}$$

For Internal Contact.

$$\cos \psi = \frac{m \sin (M - N)}{k}$$

(ψ always less than 180°)

$$v = \frac{K \sin \psi}{n} \qquad \nu = \frac{k \sin \psi}{n}$$

$$t_1 = [3.5563025] (u - v) \qquad \tau_1 = [3.5563025] (u - \nu)$$
$$t_2 = [3.5563025]$$
$$t_3 = [3.5563025] (u + v) \qquad \tau_3 = [3.5563025] (u + \nu)$$

Time of Beginning $= T + \omega + t_1$ Time of First Internal Contact $= T + \omega + \tau_1$
Time of Greatest Obscuration - - - $= T + \omega + t_2$
Time of End - - - $= T + \omega + t_3$ Time of last Internal Contact $= T + \omega + \tau_3$

The result for Greatest Obscuration will generally be within a second of the truth; and the results for Beginning and End within two or three minutes. If greater accuracy is required for these phases, the computations must be repeated by assuming T_1 and T_3 near to the times $T + t_1$ and $T + t_3$ and taking out the co-ordinates for these times respectively.

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When $m \sin (M-N)$ is greater than K, $\cos \psi$ will be impossible, and the Moon will pass the Sun without producing an Eclipse at the place. If $m \sin (M-N)$ is less than K, there will be an Eclipse at the place, visible (if the Sun be above the horizon) as a Partial Eclipse if $m \sin (M-N)$ is greater than k,—as a Total or Annular Eclipse if $m \sin (M-N)$ is less than k; total when K is greater than $2\,Z \tan F$; Annular when K is less than $2\,Z \tan F$.

For the position of the points of contact on the Sun's border, let Q_1 for the first contact, and Q_3 for the last contact, be the angles of position, reckoning from the Sun's *North Point* towards East; and let V_1 and V_3 be the angles of position from the Sun's *Vertex* towards East.

$$\rho \sin \theta \sin P_1 = \xi + (u - v)\,\xi' \qquad \rho \sin \theta \sin P_3 = \xi + (u + v)\xi'$$
$$\rho \sin \theta \cos P_1 = \eta + (u - v)\,\eta' \qquad \rho \sin \theta \cos P_3 = \eta + (u + v)\eta'$$

$$Q_1 = \mathcal{N} + 90^\circ + \psi \qquad Q_3 = \mathcal{N} + 90_\circ - \psi$$
$$V_1 = Q_1 - P_1 \qquad V_3 = Q_3 - P_3$$

For the portion, $= w$, of the Sun's disc eclipsed at Greatest Obscuration, the Sun's diameter being *unity*,

$$w = \frac{K \mp m \sin (M - \mathcal{N})}{2\,(K - k \sec f)}$$

$$\text{Digits eclipsed} = D = [1.0792]\, w$$

On the Sun's North limb when $m \sin (M - N)$ is negative; on the South limb when $m \sin (M - N)$ is positive. Use upper sign when $m \sin (M - N)$ is positive; under sign when $m \sin (M - N)$ is negative.

For any other time $= T_\odot$, within the Eclipse, let t be the interval $T_\odot - T$: then

$$s \sin \psi = m \cos (M - \mathcal{N}) + [6.44370]\, n\, t$$
$$s \cos \psi = m \sin (M - \mathcal{N})$$

$$w = \frac{K - s}{2\,(K - k \sec f)}$$

If w is required for the sun in the horizon, use L instead of K.

The only place of note on the American continent, where the greatest phase of the Eclipse of May 6th will be visible, is Halifax, Nova Scotia. This place is therefore chosen for elucidating the practical application of the preceding formulæ.

To fix on a time near to that of apparent conjunction, which will not differ greatly from that of the greatest phase, we examine the table of co-ordinates, and find that the *true* conjunction must be near 22h. 40m., Greenwich mean time. Assuming this as the true time, take out the corresponding values of ΔX to three or four decimal places, d and H, to the nearest minute. Also take out ϕ and ω from the table of Latitudes and Longitudes, pages 132 and 133.

ϕ + 44 39 29	$\log \Delta X$ + 9.7051		δ + .6823
ω − 63 36 40	$\log \cos d$ + 9.9816		δ_1 + .0319
H − 19 7	comp. $\log \cos \phi$ + 0.1479		$\delta - \delta_1$ + .6504
$H + \omega$ k − 82 44	$\log \dfrac{\Delta X \cos d}{\cos \phi}$ - $\log \delta$ + 9.8346		comp $\log (\delta - \delta_1)$ + 0.1868
d + 16 33	const 9.4027		$\log \sin k$ − 9.9965
ΔX + 0.5071	$\log \cos k$ + 9.1020		const 1.7782
$\log [9.4027] \cos k$ - - $\log \delta_1$ + 8.5047		$\log [1.7782] \dfrac{\sin k}{\delta - \delta_1}$ - - $\log t$ − 1.9615	
22h 40m + t	21h 9m		t − 1h 31m

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Hence we may assume $T = 21h\ 10m.$, Greenwich mean time, for a radical computation. Taking out the co-ordinates etc. for this time we have

T 21h 10m

		° ′ ″			
	d	+ 16 32 27	X . . p	— 0.69104	log I 7 06636
	H	— 41 36 45	Y . . q	+ 0.87543	L 0.56257
	w	— 63 36 40	$\triangle X$ . . p'	+ 0 50705	log i 7.06419
$H + w$	h	—105 13 25	$\triangle Y$ . . q'	+ 0.10110	i 0.01612
		h. m. s.			
In time	w	— 4 14 26.7	$k \sec f$	0.27250	log λ 9.41803

		° ′ ″
	M +	358 39 47
	N +	74 40 40
	$M - N$ +	283 59 7
	ψ +	105 10 28
	log sin $(M - N)$ —	9.98693
	log m +	9.18108
	log m sin $(M - N)$ —	9.16801
	log K	9.75011
	log $\frac{m \sin (M - N)}{K}$. log cos ψ —	9.41790
	log sin ψ +	9.98439
	log K sin ψ +	9.72450
	log n +	9.76083
	log $\frac{K \sin \psi}{n}$ . . . log v +	9.97367
	log cos $(M - N)$ +	9.38323
	log W —	9.42025
	log W cos $(M - N)$. log u —	8.80348
	u —	.06360
	v +	.94161
	$u - v$ —	1.00521
	$u + v$ +	.87801
	const	3.55630
	log [3.55630] u . . log t_3 —	2.35978
	log $(u - v)$ —	0.06861
	log [3.55630] $(u - v)$. log t_1 —	3.55721
	log $(u + v)$ +	9.94359
	log [3.55630] $(u + v)$. log t_2 +	3.49989
		h. m. s.
	T	21 10 0.0
	ω —	4 14 26.7
	$T + \omega$	16 55 33.3
	t_1 —	1 0 7.5
Beginning .	$T + \omega + t_1$	15 55 25.8
	t_2 —	3 49.0
Greatest Obscu.	$T + \omega + t_3$	16 51 44.3
	t_3 +	52 40.8
End, . .	$T + \omega + t_2$	17 48 14.1

	$m \sin (M - N)$ —	.14792
	K	.56248
	$K + m \sin (M - N)$	.41525
	$k \sec f$	.27250
	$K - k \sec f$	.28998
	$2(K - k \sec f)$	.57996
	log $\{ K - m \sin (M - N) \}$	9.61831
	log $2(K - k \sec f)$	9.76340
	log w	9.85491
	const	1 0792
	log D	0.9341
Digits eclipsed on Sun's N. limb	D	8.50
Mag. of Eclipse (Sun's diam = 1)	w	.716

Computed p. 167, .	log $r \sin \phi'$ +	9.84473
	log cos d +	9.98165
log $r \sin \phi' \cos d$ . .	log ζ +	9.82639
Computed p. 167. .	log $r \cos \phi'$ +	9.83278
	log sin h —	9.98449
log $r \cos \phi' \sin h$ . .	log ξ —	9.83727
	log sin d +	9.45430
	log cot h +	9.43479
log sin d cot h . .	log β +	8.88918
	log $\beta \xi$ —	8.72645
	log λ	9.41803
	log $\lambda \xi$ —	9.25530
log $\lambda \xi$ cot h . . .	log ξ' —	8.69009
log $\lambda \xi$ sin d . . .	log η' —	8.70969
	log tan d +	9.47274
	log ζ tan d +	9.29912
	log $\beta \xi$ cot d —	9.25371
	ξ —	.68750
	p —	.69104
$p - \xi$	m sin M —	.00354
	ζ +	.67047
	$\beta \xi$ —	.05327
$\zeta - \beta \xi$	η +	.72374
	q +	.87543
$q - \eta$	m cos M +	.15169
	ξ' —	.04899
	p' +	.50705
$p' - \xi'$	n sin N +	.55604
	η' —	.05125
	q' +	.10110
$q - \eta'$	n cos N +	.15235
	ζ tan d +	.19912
	$\beta \xi$ cot d —	.17935
ζ tan $d + \beta \xi$ cot d . .	ρ +	.01977
	log ρ +	8.29601
	log I	7.06636
	log $I \rho$ +	5 96237
	$I \rho$ +	.00909
	L	.56257
$L - I \rho$ . . .	K +	.56248
	log m sin M —	7.54900
	log m cos M +	9.18696
	log tan M —	8.36204
	log cos M +	9.99968
	log m +	9.18108
	log n sin N +	9.74511
	log n cos N +	9.18284
	log tan N +	0.56227
	log sin N +	9.98428
	log n +	9.76083
$- \log \frac{m}{n}$	log W —	9.42025

By computing the time of *Sun-rise* at Halifax, it will be seen that the beginning of the Eclipse must take place with the Sun below the horizon. The determination of the magnitude of the Eclipse at Sun-rise is as follows:

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		h m. s.
Computed time of Sun-rise	T_0	16 44 10.9
	$T + \omega$	16 55 33.3
$T_0 - (T + \omega)$	t	— 11 23.1
	$\log t$	— 2.8345
	$\log n$	+ 9.7608
	const	6.4437
	$\log [6.4437]\, n\, t$	— 9.0390
	$\log \cos (M - N)$	+ 9.3832
	$\log m$	+ 9.1811
	$\log m \cos (M - N)$	+ 8.5643
	$m \cos (M - N)$	+ .0367
	$[6.4437]\, n\, t$	— .1094
	$s \sin \psi$	— .0727

$\log s \sin \psi$	— 8.8615
$\log m \sin (M - N)$ · $\log s \cos \psi$	— 8.8715
$\log \tan \psi$	+ 9.6935
$\log \cos \psi$	— 9.9526
$\log s$	+ 9.2134
s	+ .1642
L	.5696
$L - s$	.3964
$k \sec f$	.2725
$L - k \sec f$	.2901
$2(L - K \sec f)$	.5802
$\log (L - s)$	9.6003
$\log 2(L - k \sec f)$	9.7636
$\log w$	9.8367
const	1.0792
$\log D$	0.9159
Digits eclipsed at Sunrise, on Sun's north limb · D	8.24
Magnitude of Eclipse at Sunrise (Sun's diameter = 1) w	.687

By comparing $m \sin (M - N)$ with l, it will be seen that it is greater than $l - i\rho$ and consequently, that the Eclipse can not be either *Annular* or *Total* at Halifax.

The Greenwich Mean Time $= T' + t_3$, of the End of the Eclipse, obtained by this computation, being 22h 2m 41s, we may assume $T_3 =$ 22h 5m, for a more accurate determination of this phase. Taking out the corresponding values of the co-ordinates, etc., we have

	° ″ ′				
d	+ 16 33 4	p	— .226223	$\log I$	7.66635
H	— 27 51 38	q	+ .967986	L	.562659
ω	— 63 36 40	p'	+ .507096	$k \sec f$	.272502
h	— 91 28 18	q'	+ .190836	$\log \lambda$	9.41893

	$\log r \sin \phi'$	+ 9.84473
	$\log \cos d$	+ 9.98162
$\log r \sin \phi' \cos d$ · · $\log \zeta$		+ 9.82635
	$\log r \sin \phi'$	+ 9.85278
	$\log \sin h$	— 9.99966
$\log r \cos \phi' \sin h$ · · $\log \xi$		— 9.85244
	$\log \sin d$	+ 9.45465
	$\log \cot h$	+ 8.40978
$\log \sin d \cot h$ · · · $\log \beta$		+ 7.86443
	$\log \beta \xi$	— 7.71707
	$\log \lambda$	9.41803
	$\log \lambda \xi$	— 9.27067
$\log \lambda \xi \cot h$ · $\log \xi'$		— 7.68045
$\log \lambda \xi \sin d$ · · $\log \eta'$		— 8.72522
	$\log \tan d$	+ 9.47303
	$\log \zeta \tan d$	+ 9.29938
	$\log \beta \xi \cot d$	— 8.24464
	ξ	— .71226
	p	— .22622
$p - \xi$ · · · · $m \sin M$		+ .48604
	ζ	+ .67042
	$\beta \xi$	— .00521
$\zeta - \beta \xi$ · · · · · η		+ .67563
	q	+ .96799
$q - \eta$ · · · · $m \cos M$		+ .29236
	ξ'	— .00479
	p'	+ .50710
$p' - \xi'$ · · · · $n \sin N$		+ .51189
	η'	— .05313
	q'	+ .10084
$q' - \eta$ · · · · $n \cos N$		+ .15397
	$\zeta \tan d$	+ .19924
	$\beta \xi \cot d$	— .01754
$\zeta \tan d + \beta \xi \cot d$ · · ρ		+ .18170
	$\log \rho$	+ 9.25935
	$\log I$	7.66635
	$\log I \rho$	+ 6.92570

	$I \rho$	+ .00084
	L	.56266
$L - I \rho$ · · · · K		+ .56182
		° ′ ″
	M	+ 58 58 20
	N	+ 73 15 34
	$M - N$	— 14 17 14
	$\log m \sin M$	+ 9.68667
	$\log m \cos M$	+ 9.46592
	$\log \tan M$	+ 0.22075
	$\log \sin M$	+ 9.93294
	$\log m$	+ 9.75373
	$\log n \sin N$	+ 9.70918
	$\log n \cos N$	+ 9.18744
	$\log \tan N$	+ 0.52174
	$\log \sin N$	+ 9.98119
	$\log n$	+ 9.72799
$-\log \frac{m}{n}$ · · · · $\log W$		— 0.02574
	$\log \sin (M - N)$	— 9.39232
	$\log m \sin (M - N)$	— 9.14605
	$\log K$	+ 9.74960
$\log \frac{m \sin (M - N)}{K}$ · $\log \cos \psi$		— 9.39645
	$\log \sin \psi$	+ 9.98608
	$\log K \sin \psi$	+ 9.73568
$\log \frac{K \sin \psi}{n}$ · · · $\log v$		+ 0.00769
	$\log \cos (M - N)$	+ 9.98636
$\log W \cos (M - N)$ · $\log u$		— 0.01210
	u	— 1.02825
	v	+ 1.01786
	$u + v$	— .01039
	$\log (u + v)$	— 8.01662
	const	3.55630
$\log [3.55630] (u + v)$ · $\log t_3$		— 1.57292
		h. m. s.
	T_3	22 5 0.0
	ω	— 4 14 26.7
	$T_3 + \omega$	17 50 33.3
	t_3	— 37.4
End of Eclipse $T_3 + \omega + t_3$		17 49 55.9

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$\log \xi'$	$-$ 7.68045	$\log \rho \sin \theta\, P_3$	$-$ 9.85261
$\log (u+v)\, \xi'$	$+$ 5.69707	$\log \rho \sin \theta \cos P_3$	$+$ 9.83006
$(u+v)\, \xi'$	$+$ .00005	$\log \tan P_3$	$-$ 0.02255
ξ	$-$ .71226		° ′ ″
$\xi + (u+v)\, \xi' - \rho \sin \theta \sin P_3$	$-$ .71221	$\mathcal{N} + 90°$	$+$ 163 15 24
$\log \eta'$	$-$ 8.72532	ψ	$+$ 104 25 37
$\log (u+v)\, \eta'$	$+$ 6.74194		
$(u+v)\, \eta'$	$+$ .00055		
η	$+$ .67563		
$\eta + (u+v)\, \eta' \quad \rho \sin \theta \cos P_3$	$+$ .67618		

Angle of Last Contact from Sun's *North Point* toward East -	Q_3	$+$ 58 49 57
	P_3	$-$ 46 29 13
Angle of Last Contact from Sun's *Vertex* towards East - -	V_3	$+$ 105 19 10

Collecting the results of this and the preceding computations, we have the Phases, etc., of the Eclipse as follows:—

		d.	h.	m.	s.
Sun rises Eclipsed, Astronomical Mean Time,	May	5	16	44	10 2
Sun rises Eclipsed, Civil Mean Time,	"	6	4	44	10.2m
Greatest Obscuration,	"	"	4	51	44.3"
End of the Eclipse,	"	"	5	49	25.9"

	° ′ ″
Angle of Last Contact from Sun's *North Point* towards East,	58 49 57
Angle of Last Contact from Sun's *Vertex* towards East,	105 19 10
Digits Eclipsed at *Sun-rise*, on the North Limb,	8.24
Magnitude of Eclipse at *Sun-rise*, (Sun's diameter = 1)	0.687
Digits Eclipsed at Greatest Obscuration, on the North Limb,	8.59
Magnitude of Eclipse at Greatest Obscuration, (Sun's diameter = 1)	0.716

Computation of Occultations of Fixed Stars by the Moon.

The following is Bessel's method of computing occultations, (published in *Encke's Astronomisches Jahrbuch* for 1844), by means of the quantities T, H, p, q, p', q', given in pages 85 to 87.

T is assumed as the Greenwich Mean Time of the nearest approach of the Moon's centre to the Star, for that part of the continent where the Occultation will take place under the most favourable circumstances, and is the time for which the other quantities are computed. H is the true Greenwich hour-angle of the Star at the time T.

The objects of determination in computing Occultations for a particular place are, the times of the Star's *Immersion* and *Emersion*, and the position of the points on the Moon's border, where the Immersion and Emersion take place. Denoting by ϕ the Latitude of the place (South Latitudes negative,) by ω the Longitude (West Longitudes negative), and by D the Star's Declination, (South Declinations negative), compute $\log r \sin \phi'$ and $\log r \cos \phi'$ by the formula on page 167, and take out T, H, p, q, p', and q', from the Ephemeris:

$$h = H + \omega$$

$$\log \lambda = 9.41916 \qquad \log. k = 9.43537$$

$$\zeta = r \sin \phi' \cos D \qquad \eta = \zeta - \beta \xi$$
$$\xi = r \cos \phi' \sin h \qquad \xi' = \lambda \xi \cot h$$
$$\beta = \sin D \cot h \qquad \eta' = \lambda \xi \sin D$$

$$m \sin M = p - \xi \qquad n \sin \mathcal{N} = p' - \xi'$$
$$m \cos M = q - \eta \qquad n \cos \mathcal{N} = q' - \eta'$$

$$W = -\frac{m}{n} \qquad u = W \cos (M - \mathcal{N})$$

$$\cos \psi = \frac{m \sin (M\ \mathcal{N})}{k} \qquad (\psi \text{ always less than } 180°)$$

$$v = \frac{k \sin \psi}{n}$$

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$$t_1 = [3.55630]\,(u - v)$$
$$t_2 = [3.55630]\,u$$
$$t_3 = [3.55630]\,(u + v)$$

Mean Time of Immersion $= T + \omega + t_1$
Mean Time of Nearest Approach $= T + \omega + t_2$
Mean Time of Emersion $= T + \omega + t_3$

$$\rho \sin\theta \sin P_1 = \xi + (u - v)\,\xi' \qquad \rho \sin\theta \sin P_3 = \xi + (u + v)\,\xi'$$
$$\rho \sin\theta \cos P_1 = \eta + (u - v)\,\eta' \qquad \rho \sin\theta \cos P_3 = \eta + (u + v)\,\eta'$$
$$Q_1 = \mathcal{N} - 90^\circ + \psi \qquad Q_3 = \mathcal{N} - 90^\circ - \psi$$
$$V_1 = Q_1 - P_1 \qquad V_3 = Q_3 - P_3$$

In the last equations, Q_1 for *Immersion*, and Q_3 for *Emersion*, are the angles of position of the points on the Moon's limb where the disappearance and re-appearance of the Star take place; reckoning from the Moon's *North Point* towards East. V_1 and V_3 are the angles of position of the same points reckoned from the Moon's *Vertex* towards East. These angles are for *direct* vision. For the appearance as seen in an *inverting telescope*, add 180°.

To illustrate the application of these equations we give the computation of the Occultation of ζ Tauri, January 19, 1845, for Philadelphia. Taking the Latitude and Longitude from pages 134 and 135, and the quantities from page 85, we have

T 18h 0m

	° ′		h. m. s.		
φ	− 75 10.5	*In Time* ω	− 5 0 41.9	p	+ 0.6327
H	+ 127 22.2		° ′	q	+ 0.5709
δ	+ 52 12	D	+ 21 3	p'	+ 0.5499
				q'	− 0.0183

	$\log r \sin\phi'$ + 9.8054		$\log m \sin \mathcal{M}$ + 8.4166
	$\log \cos D$ + 9.9700		$\log m \cos \mathcal{M}$ + 9.1575
$\log r \sin\phi' \cos D$	$\log \zeta$ + 9.7754		$\log \tan \mathcal{M}$ + 9.2591
	$\log r \cos\phi'$ + 9.8852		$\log \cos \mathcal{M}$ + 9.9929
	$\log \sin h$ + 9.8977		$\log m$ + 9.1645
$\log r \cos\phi' \sin h$	$\log \xi$ + 9.7829		$\log n \sin \mathcal{N}$ + 9.6298
	$\log \sin D$ + 9.5553		$\log n \cos \mathcal{N}$ − 8.8779
	$\log \cot h$ + 9.8897		$\log \tan \mathcal{N}$ − 0.7519
$\log \sin D \cot h$	$\log \beta$ + 9.4450		$\log \sin \mathcal{N}$ + 9.9933
	$\log \beta\,\xi$ + 9.2279		$\log n$ + 9.6365
	$\log \lambda$ 9.4192	$-\log \frac{m}{n}$	$\log W$ − 9.5930
	$\log \lambda\,\xi$ + 9.2021		$\log \sin (\mathcal{M} - \mathcal{N})$ − 0.0000
$\log \lambda\,\xi \cot h$	$\log \xi'$ + 9.0918		$\log m \sin (\mathcal{M} - \mathcal{N})$ − 9.1645
$\log \lambda\,\xi \sin D$	$\log \eta'$ + 8.7574		$\log k$ 9.4354
	ξ + .6066	$\log \frac{m \sin (\mathcal{M} - \mathcal{N})}{k}$	$\log \cos \psi$ − 9.7291
	p + .6327		$\log \sin \psi$ + 9.9265
$p - \xi$	$m \sin \mathcal{M}$ + .0261		$\log k \sin \psi$ + 9.3619
	ζ + .5962	$\log \frac{k \sin \psi}{n}$	$\log v$ + 9.7254
	$\beta\,\xi$ + .1690		$\log \cos (\mathcal{M} - \mathcal{N})$ + 7.6398
$\zeta - \beta\,\xi$	η + .4272	$\log W \cos (\mathcal{M} - \mathcal{N})$	$\log u$ − 7.1678
	q + .5709		° ′
$q - \eta$	$m \cos \mathcal{M}$ + .1437		$\mathcal{M}$ + 10 17
	ξ + .1235		$\mathcal{N}$ + 100 2
	p' + .5499		$\mathcal{M} - \mathcal{N}$ − 89 45
$p' - \xi'$	$n \sin \mathcal{N}$ + .4264		u − .0015
	η' + .0572		v + .5314
	q' − .0183		$u - v$ − .5329
$q - \eta$	$n \cos \mathcal{N}$ − .0755		$u + v$ + .5299
			const 3.5563
			$\log (u - v)$ − 9.7266
		$\log [3.5563]\,(u - v)$	$\log t_1$ − 3.2829
			$\log (u + v)$ + 9.7242
		$\log [3.5563]\,(u + v)$	$\log t_3$ + 3.2805

		h. m. s.
	T	18 0 0
	ω	− 5 0 42
	$T + \omega$	12 59 18
	t_1	− 31 58
Immersion; Philadelphia Mean Time	$T + \omega + t_1$	12 27 20
	t_3	+ 31 48
Emersion; Philadelphia Mean Time	$T + \omega + t_3$	13 31 6

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$\log \xi' +$	9.0318		$\xi +$		.6066
$\log (u - v) -$	9.7266		$(u - v)\ \xi' -$		.0658
$\log (u - v)\ \xi' -$	8.8184	$\xi + (u - v)\ \xi'$	$\rho \sin \theta \sin P_1 +$		.5408
$\log (u + v) +$	9.7242		$(u + v)\ \xi' +$		.0655
$\log (u + v)\ \xi' +$	8.8160	$\xi + (u + v)\ \xi'$	$\rho \sin \theta \sin P_3 +$		.6721
			$\eta +$		.4272
$\log \eta' +$	8.7574		$(u - v)\ \eta' -$		.0305
$\log (u - v) -$	9.7266	$\eta + (u - v)\ \eta'$	$\rho \sin \theta \cos P_1 +$		.3967
$\log (u - v)\ \eta' -$	8.4840		$(u + v)\ \eta' +$		.0303
$\log (u + v) +$	9.7242	$\eta + (u + v)\ \eta'$	$\rho \sin \theta \cos P_3 +$		.4575
$\log (u + v)\ \eta' +$	8.4816		$\log \rho \sin \theta \sin P_1 +$		9.7330
			$\log \rho \sin \theta \cos P_1 +$		9.5985
			$\log \tan P_1 +$		0.1345
			$\log \sin \theta \sin P_3 +$		9.8275
			$\log \sin \theta \cos P_3 +$		9.6604
			$\log \tan P_3 +$		0.1671

		°	′
	$N - 90 +$	10	2
	$\psi +$	122	24
Immersion Angle from N. Point towards E.	$Q_1 +$	132	26
Emersion Angle from N. Point towards E.	$Q_3 +$	247	38
	$P_1 +$	53	44
	$P_3 +$	55	46
Immersion Angle from Vertex towards E.	$V_1 +$	78	42
Emersion Angle from Verex towards E.	$V_3 +$	191	52

When $m \sin (M - N)$ is greater than k, $\cos \psi$ will be impossible, and there will be no Occultation at the place. The distance of the Star from the Moon's centre, will $= m \sin (M - N)\ \pi$, where π is the Moon's Horizontal Parallax. When the Occultation takes place near the time of the Moon's rising or setting, a comparison of $k_4 + t_1$, or $k + t_3$, (*in Time*) with the Star's semi-diurnal arc from page 116 or 117 will determine whether it is above or below the horizon. If T represented the *true* time of Nearest approach, we might decide with certainty whether there would be an Occultation at the place by computing $(q - \eta)$ which should not exceed 0.2725. But as approximate values only of T can be given for an extended territory, this limit may be increased to about 0.3.

When it is desirable to compute the Occultations of small stars not included in the catalogue given in this work, the values of p, q, p', and q', may be determined by the following equations;—

$$p = \frac{a - A}{\pi} \cos \delta \qquad p' = \frac{\Delta a}{\pi} \cos \delta$$

$$q = \frac{\delta - D}{\pi} \qquad q' = \frac{\Delta \delta}{\pi}$$

In which a is the Moon's Right Ascension, δ its Declination, and π its Horizontal Parallax at Apparent Conjunction in Right Ascension. A the Star's Right Ascencension and D its Declination; Δa and $\Delta \delta$, the hourly variations of a and δ. North Declinations positive: South Declinations negative: $\Delta \delta$ negative when the Moon's motion is towards South.

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PART II.

STATISTICAL AND POLITICAL VIEW

OF THE GOVERNMENT, COMMERCE, MANUFACTURES, REVENUE, EXPENDITURES, PRODUCTS, AND GENERAL RESOURCES OF THE

UNITED STATES OF AMERICA.

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PRINCIPAL OFFICERS OF THE UNITED STATES.

I. EXECUTIVE.

	Salary.
John Tyler, of Virginia, *President*,	$25,000
——— *Vice President*,	5,000

At the last Presidential Election, 1840, William Henry Harrison, of Ohio, was elected President, and John Tyler, of Virginia, Vice President of the United States of America, for the 14th Presidential term since the adoption of the Constitution. These officers entered upon their several duties, March 4th, 1841. On the death of William Henry Harrison, April 4th, 1841, the Vice President, John Tyler, assumed the Presidency, agreeably to the provisions of the Constitution. The 14th Presidential term will expire on the 3d of March, 1845.

THE CABINET.

	Salary.
John C. Calhoun, South Carolina, *Secretary of State*,	$6,000
George M. Bibb, Kentucky, *Secretary of the Treasury*,	6,000
William Wilkins, Pennsylvania, *Secretary of War*,	6,000
John Y. Mason, Virginia, *Secretary of the Navy*,	6,000
Charles A. Wickliffe, Kentucky, *Postmaster-General*,	6,000
John Nelson, Maryland, *Attorney-General*,	4,000

The officers of the Cabinet hold their offices at the will of the President, but are appointed with the consent of the Senate.

DEPARTMENT OF STATE.

(*The following list of Officers was corrected at the Department of State, June 22d*, 1844.)

	Salary.
John C. Calhoun, *Secretary*,	$6,000
Rich'd K. Cralle, *Chief Clerk*,	2,000
Clerks.	
DIPLOMATIC BUREAU.	
Wm. S. Derrick,	1,600
Wm. Hunter, Jr.,	1,500
Francis Markoe,	1,400
Alex. H. Derrick,	900
Wm. C. Zantzinger,	800
CONSULAR BUREAU.	
Robert S. Chew,	1,400
James S. Ringgold,	1,400
HOME BUREAU.	
T. W. Dickins,	1,400
Horatio Jones,	$1,000
George Hill,	1,400
Charles H. Winder,	1,400
TRANSLATOR AND LIBRARIAN.	
Robert Greenhow,	1,600
DISBURSING AGENT.	
Edward Stubbs,	1,450
PATENT OFFICE.	
Commissioner of Patents.	
Henry L. Ellsworth,	3,000
Chief Clerk.	
———,	1,700

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INTERCOURSE WITH FOREIGN NATIONS.

ENVOYS EXTRAORDINARY AND MINISTERS PLENIPOTENTIARY IN FOREIGN COUNTRIES, WITH THEIR RESIDENCES AND SECRETARIES OF LEGATION.

Ministers.	Salary.	Sec's of Legation.	Salary.
Great Britain.—Edward Everett, *London*,	$9,000	F. R. Rives,	$2,000
Russia.—Charles S. Todd, *St. Petersburg*,	9,000	J. S. Maxwell,	2,000
France.—Wm. R. King, *Paris*,	9,000	J. L. Martin,	2,000
Spain.—Washington Irving, *Madrid*,	9,000	Jasper H. Livingston,	2,000
Prussia.—Henry Wheaton, *Berlin*,	9,000	Theo. S. Fay,	2,000
Austria.—Daniel Jenifer, *Vienna*,	9,000	John R. Clay,	2,000
Mexico.—Wilson Shannon, *Mexico*,	9,000	B. E. Green,	2,000
Brazil.—Henry A. Wise, *Rio de Janeiro*,	9,000	R. M. Walsh,	2,000
Turkish Dominions.—Dabney S. Carr (Minister Resident), *Constantinople*,	6,000	John P. Brown (Drogaman),	2,500
China.—Caleb Cushing (Commissioner),	9,000	Fletcher Webster (Sec. to the Mission)	4,500

CHARGES D'AFFAIRES IN FOREIGN COUNTRIES, WITH THE PLACES OF THEIR RESIDENCE.

Countries.	Charges d'Affaires.	Residences.	Salary.
Portuguese Dominions,	Abraham Rencher,	Lisbon,	$4,500
Belgium,	Thomas G. Clemson,	Brussels,	4,500
Dominions of the Netherlands,	Christopher Hughes,	Hague,	4,500
Danish Dominions,	William W. Irwin,	Copenhagen,	4,500
Sweden and Norway,	George W. Lay,	Stockholm,	4,500
Sardinian States,	Robert Wickliffe, Jr.	Turin,	4,500
Kingdom of the Two Sicilies,	William Boulware,	Naples,	4,500
Texas,	Tilghman A. Howard,		4,500
New Grenada,	Wm. M. Blackford,	Bogota,	4,500
Venezuela,	Allen A. Hall,	Caraccas,	4,500
Argentine Republic, or Buenos Ayres,	William Brent, Jr.,	Buenos Ayres,	4,500
Chile,	William Crump,	Sant Iago,	4,500
Peru,	James C. Pickett,	Lima,	4,500

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CONSULS AND COMMERCIAL AGENTS OF THE UNITED STATES IN FOREIGN COUNTRIES.

These officers enjoy no emoluments beyond their *fees*, except in those cases in which specific salaries are stated in the table.

BRITISH DOMINIONS.

ENGLAND.

Thos. Aspinwall, London, . . $2,000
Albert Davy, Leeds.
James Hagarty, Liverpool.
Francis B. Ogden, Bristol.
Robert W. Fox, Falmouth.
Thomas Were Fox, Plymouth.
Jos. R. Croskey, Cowes, Isle of Wight.

SCOTLAND.

Robert Grieve, Leith, Port of Edinburgh.
Edward Baxter, Dundee.
Thomas M'Guire, Glasgow,

IRELAND.

Thomas Wilson, Dublin.
James Shaw, Belfast.
James M'Henry, Londonderry.
John Murphy, Cork.
Michael Kennedy, Galway.

IN AND NEAR EUROPE AND AFRICA.

Horatio Sprague, Gibraltar.
Wm. W. Andrews, Island of Malta.
Wm. Carroll, Com. Agent, Island of St. Helena.
Isaac Chase, Cape-Town, Cape of Good Hope.
Robert P. Desilver, Com. Agent, Port-Louis, Mauritius, or Isle of France.

NORTH AMERICA.

Israel D. Andrews, St. Johns, N. B.
T. B. Livingston, Halifax, N. S.
James Primrose, Pictou, N. S.
Chas. H. Delavan, Sydney, N. S.

WEST INDIES.

Wm. Tudor Tucker, Bermuda.
Timothy Darling, Nassau, Bahama Islands.
John Arthur, Turk's Island.
Robert M. Harrison, Kingston, Ja.
Wm. R. Hayes, Barbadoes.
William Macomb, Trinidad.
Rd. S. Hagenbotham, Com. Agent, St. Christopher and Antigua.

SOUTH AMERICA.

Moses Benjamin, Demarara, British Guiana.

AUSTRALASIA.

James H. Williams, Sydney, New South Wales.
Elisha Hathaway, Jr., Hobart Town.

EAST INDIES.

——— ———, Bombay.
Joseph Balestier, Singapore.
James B. Higginson, Calcutta.

RUSSIA.

On the Baltic Sea.

Abraham P. Gibson, St. Petersburg.
Alex. Schwartz, Riga.
Edmund Brandt, Archangel.

On the Black Sea.

John Ralli, Odessa.

FRENCH DOMINIONS.

FRANCE.

Lorenzo Draper, Paris, ... $2,000
H. C. Eaton, Lyons.
Thomas Hulme, Jr., Sedan.

PORTS ON THE ATLANTIC.

Reuben G. Beasley, Havre.
Essex R. Livingston, Nantes

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Francis M. Auboyneau, La Rochelle.
John Warren Grigsby, Bordeaux.

PORTS ON THE MEDITERRANEAN.

Daniel C. Croxall, Marseilles.

FRENCH GUIANA.

Joseph W. Forbes, Cayenne.

WEST INDIES.

John W. Fisher, Point a Pitre, Guadeloupe.
Philip A. de Creny, St. Pierre, Martinique.

AFRICA.

Francis Lacrouts, Algiers.

SPANISH DOMINIONS.

SPAIN.

Maximo de Aguirre, Bilbao.
Alexander Burton, Cadiz.
George Read, Malaga.
P. Pou, Barcelona.
Obadiah Rich, Port Mahon, Island of Minorca.

CUBA.

Robert B. Campbell, Havanna.
Thomas M. Rodney, Matanzas.
Samuel M'Lean, Trinidad de Cuba.
Michael Mahon, Sant-Iago de Cuba.
Wm. Hogan, Nuevitas.
John Hartmann, Baracoa.
——— ———, Xibara.
Franklin Gage, Cardenas.
Josiah Raymond, Manzanilla.

PUERTO RICO.

James C. Gallaher, Ponce.
O. S. Morse, San Juan or St. John's.
Gurdon Bradley, Mayaguez.
William H. Tracy, Guayama.

OTHER SPANISH ISLANDS.

Joseph Cullen, Teneriffe, Canary.
Henry P. Sturgis, Manilla, Philippine.

PORTUGUESE DOMINIONS.

PORTUGAL.

Wm. H. Vesey, Lisbon.
Louis Tinelli, Oporto.

PORTUGUESE ISLANDS.

Charles W. Dabney, Fayal, Azores.
John H. March, Funchal, Madeira.
Ferd. Gardner, St. Jago, Cape Verd.

BELGIUM.

F. J. Grund, Antwerp.

DOMINIONS OF THE NETHERLANDS.

HOLLAND.

Charles Nichols, Amsterdam.
Wm. S. Campbell, Rotterdam.

COLONIES OF THE NETHERLANDS.

Wm. H. Freeman, Curacao, West India island.
Owen M. Roberts, Batavia, Java, East India island.

DANISH DOMINIONS.

DENMARK.

Charles F. Ryan, Copenhagen.
Edmund L. Rainals, Elsineur.

WEST INDIES.

David Rogers, Sainte Croix, or Santa Cruz.

SWEDEN AND NORWAY.

Charles D. Arfwedson, Stockholm, Sweden.
C. A. Murray, Gothenburg, Sweden.
Helmich Janson, Bergen, Norway.

PRUSSIA.

Louis Mark, for the Prussian Provinces of the Rhine.
Frederick Schillow, Stettin.

AUSTRIA.

J. G. Schwarz, Vienna.
George Moore, Trieste.
Albert Dabadie, Venice.

SAXONY.

George Mohr, Dresden.
John G. Flugel, Leipsick.

BAVARIA.

Louis Mark, for the Kingdom of Bavaria and Prussian Provinces of the Rhine.

WURTEMBERG.

Frederick List, Stuttgard.

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GRAND-DUCHY OF HESSE.
Charles Graebe, Cassel.

BADEN.
George F. Gerding, Manheim.

GRAND-DUCHY OF MECKLENBURG-SCHWERIN.
——— ———, Rostock.

HANSEATIC or FREE CITIES.
John Cuthbert, Hamburg.
A. D. Mann, Bremen.
Ernest Schwendler, Frankfort on the Main.

SWITZERLAND.
Seth T. Otis, Basil or Basle.
Henry Mahler, Zurich.

SARDINIAN STATES.
C. Edwards Lester, Genoa.
Victor A. Sasserno, Nice.

TUSCANY.
J. A. Binda, Leghorn.
Edward Gamage, Florence.

PONTIFICAL STATES.
George W. Greene, Rome.
Henry J. Brent, Ravenna.
James E. Freeman, Ancona.

KINGDOM OF THE TWO SICILIES.
Alexander Hammett, Naples.
John M. Marston, Palermo, Sicily.
John L. Payson, Messina, do.

TURKISH DOMINIONS.
George A. Porter, Constantinople.
David W. Offley, Smyrna.
Jasper Chasseaud, Beirout, Damascus, and Said, ...$500

UNDER THE GOVERNMENT OF THE PASHA OF EGYPT.
John Gliddon, Alexandria, Egypt.

GREECE.
Gregory A. Perdicaris, Athens.

BARBARY STATES.
John F. Mullowny, Tangiers, Morocco, ...$2,000
J. H. Payne, Tunis, Tunis, .$2,000
Daniel S. Macauley, Tripoli, Tripoli, ...$2,000

DOMINIONS OF THE IMAUM OF MUSCAT.
Syed Ben Calfaun, Muscat.
Richard P. Waters, Island of Zanzibar, near the east coast of Africa.

CHINA.
Paul S. Forbes, Canton.
Thomas G. Peachy, Amoy.

INDEPENDENT PACIFIC ISLANDS.
Geo. Brown, Commissioner, Sandwich Islands, ...$3,000
Samuel R. Blackler, Tahiti, Society Islands.
John B. Williams, Bay of Islands, New Zealand.
Peter A. Brinsmade, Comm'l Agent, Oahu, Sandwich Islands.

HAYTI or SAN DOMINGO.
Joseph C. Luther, Commercial Agent, Port au Prince.
Rich'd Loring, Com. Agent, Aux Cayes (July 1844).
George F. Usher, Comm'l Agent, Cape Haytien.

REPUBLIC OF TEXAS.
Morgan L. Smith, Velasco.
A. M. Green, Galveston.
Stewart Newell, Sabine.
W. W. T. Smith, Matagorda.

MEXICAN REPUBLIC.
John Black, Mexico.
——— ———, Chihuahua.
Manuel Alvarez, Santa Fe.

ON THE ATLANTIC SIDE.
Franklin Chase, Tampico or Santa Anna de Tamaulipas.
Richard H. Belt, Matamoros.
F. M. Dimond, Vera Cruz and Alvarado.
Edward Porter, Tabasco.
Leonard R. Almy, Laguna, Carmen Island.

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John F. M'Gregor, Campeche.
Don Pedro de Regil y Estrada, Merida and Sisal.

ON THE PACIFIC SIDE.

Thomas O. Larkin, Monterey.
John Parrott, Mazatlan.
Jose Maria Castanos, San Blas.
A. M. Gilliam, San Francisco, California.
John A. Robinson, Guaymas.

CENTRAL AMERICA.

Stephen H. Weems, Guatemala, Pacific side.
A. Follin, Omoa and Truxillo.
William A. Butler, Granada, Nicaragua.

NEW GRANADA.

ON THE ATLANTIC SIDE.

Ramon Leon Sanchez, Carthagena.
Thos. W. Robeson, Santa Martha.

ON THE PACIFIC SIDE.

Jeremiah A. Townsend, Panama.

VENEZUELA.

Charles A. Leas, Maracaibo.
Franklin Litchfield, Puerto Cabello.
Jno. P. Adams, Laguayra.

EQUATOR.

Seth Sweetser, Guayaquil.

BRAZIL.

Charles B. Allen, Maranham Island.
Charles J. Smith, Para.
G. T. Snow, Pernambuco.
George W. Gordon, Rio de Janeiro.
George Black, Santos.
Lemuel Wells, Saint Catherine's Island.
John C. Pedrick, Rio Grande.
Alexander H. Tyler, Bahia de San Salvador.

URUGUAY or CISPLATINE REPUBLIC.

Robert M. Hamilton, Montevideo.

ARGENTINE REPUBLIC or BUENOS AYRES.

Amory Edwards, Buenos Ayres.

CHILE.

Eben Ritchie Dorr, Valparaiso.
Paul H. Delano, Talcahuano.
Samuel F. Haviland, Coquimbo.

PERU.

Stanhope Prevost, Lima.
Alexander Ruden, Jr., Paita.

TREASURY DEPARTMENT.

(*The following list of Officers was corrected at the Treasury Department, June 22d, 1844.*)

	Salary.
George M. Bibb, *Secretary of the Treasury*,	$6,000
McClintock Young, *Chief Clerk*,	2,000

First Comptroller.

	Salary.
James W. M'Culloh,	3,500
James Larned, *Chief Clerk*,	1,700

Second Comptroller.

Albion K. Parris,	3,000
Geo. D. Abbott, *Chief Clerk*,	1,700

First Auditor.

T. R. Wise (died July 1844),	3,000
John Underwood, *Chief Clerk*,	1,700

Second Auditor.

	Salary.
William B. Lewis,	$3,000
James Eakin, *Chief Clerk*,	1,700

Third Auditor.

Peter Hagner,	3,000
Jas. Thompson, *Chief Clerk*,	1,700

Fourth Auditor.

A. O. Dayton,	3,000
Thos. H. Gilliss, *Chief Clerk*,	1,700

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TREASURY DEPARTMENT.

Fifth Auditor.

Salary.

Stephen Pleasanton, ...$3,000
Thomas Mustin, *Chief Clerk*, 1,700

Treasurer.

William Selden, ...3,000
W. B. Randolph, *Chief Clerk*, 1,700

Register.

Thomas L. Smith, ...3,000
Michael Nourse, *Chief Clerk*, 1,700

Commissioner of the General Land Office.

Thomas H. Blake, ...3,000

Solicitor.

——— ———, ...2,000

Recorder.

John Williamson, ...2,000

Principal Clerk of Public Lands.

Salary.

John M. Moore, ...$1,800

Principal Clerk of Private Land Claims.

Joseph S. Wilson, ...1,800

Principal Clerk of the Surveys.

John Wilson, ...1,800

Solicitor of the Treasury.

Chas. B. Penrose, ...3,500

Clerks.

B. F. Pleasants, *Chief Clerk*, 1,150
F. Brinley, *Law Clerk*, ...1,500

Auditor of the Treasury for the Post Office Department.

Matthew St. Clair Clarke, ..3,000

Chief Clerk.

Peter G. Washington, ...2,000

UNITED STATES MINT AT PHILADELPHIA.

Salary.

R. M. Patterson, *Director*, ..$3,500
Isaac Roach, *Treasurer*, ...2,000
Franklin Peale, *Chief Coiner*, 2,000
Jacob R. Eckfeldt, *Assayer*, ..2,000
Jonas R. M'Clintock, *Melter and Refiner*, ...2,000
C. F. Gobrecht, *Engraver*, ..2,000

Salary.

W. C. Dubois, *Asst. Assayer*, $1,300
Randall Hutchinson, *Clerk*, ..1,100
Ed. Sprague, *Clerk, Weigh Room*, ...1,200
G. W. Edleman, *Bookkeeper*, 1,100
Geo. F. Dunning, *Director's Clerk*, ... 700

Branch Mint at New Orleans.

Salary.

Joseph M. Kennedy, *Superintendent*, ...2,500
H. C. Cammack, *Treasurer*, ..2,000
William P. Hort, *Assayer*, ..2,000

Salary.

J. L. Riddell, *Melter & Refiner*, 2,000
Philip B. Tyler, *Coiner*, ...2,000
J. F. Girault, *Clerk*, ...1,200
John Bertrand, *do.* 1,200

Branch Mint at Dahlonega, Georgia.

Salary.

J. F. Cooper, *Superintendent*, 2,000
Isaac L. Todd, *Assayer*, ...1,500

Salary.

Daniel H. Mason, *Coiner, Melter & Refiner*, ...1,500
Aug. M. Russell, *Clerk*, ...1,000

Branch Mint at Charlotte, North Carolina.

Salary.

G. W. Caldwell, *Superintendent*, ...2,000
John H. Gibbon, *Assayer*, ...1,500

Salary.

John R. Bolton, *Coiner*, ...1,500
Wm. F. Strange, *Clerk*, ...1,000

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TREASURY DEPARTMENT.

COLLECTORS OF CUSTOMS AT THE DIFFERENT PORTS IN THE UNITED STATES.

COMPENSATION AS PER BLUE BOOK.

*The Officers on this list whose names are marked thus * are Surveyors in Ports unprovided with Collectors. Those whose names are marked thus † are Officers subordinate to the Collectors of the principal Ports, or Deputy Collectors.*

MAINE.

Salary.

Passamaquoddy, Bion Bradbury, ... $1,000.00
Machias, Wm. B. Smith, .. 668.49
Frenchman's Bay, John M. Hale, ... 434.21
Penobscot, Charles J. Abbot, 638.60
Belfast, George Thacher, 1,059.31
Waldoboro, George Allen, .. 712.43
Wiscasset, Moses Shaw, .. 1359.12
Bath, Parker Sheldon, ... 1,025.18
Portland, John Anderson, 1,812.00
Saco, Tristram Storer, ... 133.42
Kennebunk, Daniel Remick, 79.75
York, Jeremiah Brooks, ... 254.87

NEW HAMPSHIRE.

Portsmouth, Lory Odell, ... 468.12

MASSACHUSETTS.

Newburyport, H. W. Kinsman, ... 1,403.26
Gloucester, Addison Gilbert, ... 2,000.00
Marblehead, Jas. Gregory, .. 232.45
Salem and Beverly, James Miller, ... 1,497.90
Boston and Charlestown, Lemuel Williams, ... 2,200.00
Plymouth, I. N. Stoddard, .. 268.48
Fall River, C. J. Holmes, . 1,341.67
Barnstable, Ebenezer Bacon, 600.38
New Bedford, Jos. T. Adams, ... 1,924.31
Edgartown, L. Thaxter, ... 250.00
Nantucket, Wm. R. Easton, 675.00

RHODE ISLAND.

Providence, W. R. Watson, 634.47
Bristol and Warren, John Howe, ... 722.74
Newport, William Ennis, .. 554.32

VERMONT.

Archibald W. Hyde is Collector for the District of Vermont, the only District in the State.

CONNECTICUT.

Salary.

Middletown, A. Baldwin, . $831.77
New London, Gerard Carpenter, ... 1,335.65
New Haven, J. Donaghe, .. 587.07
Fairfield, Joseph Thompson, 394.00
Stonington, G. R. Hallam, . 250.00

NEW YORK.

Champlain, Wm. F. Hale, 1,115.78
Oswegatchie, D. C. Judson, 1,460.10
Cape Vincent, P. Burchard, 1,014.00
Sackett's Harbour, John O. Dickey, ... 717.76
Oswego, G. H. M'Whorter, . 168.64
Niagara, Amos S. Tryon, 1,359.19
†*Black Rock*, T. C. Dwight, 730.00
Buffalo Creek, J. H. Lathrop, ... 540.00
†*Black Rock Dam*, Oscar F. Crary, ... 500.00
†*Tonawanda*, J. T. Bush, .. 250.00
†*Dunkirk*, Ernest Mullet, .. 250.00
†*Portland*, Gerris Foot, ... 250.00
Sag Harbour, H. T. Dering, 815.92
New York, C. P. Van Ness (July 1844), ... 6,000.00
Genesee, Lyman B. Langworthy, ... 1,004.79

NEW JERSEY.

Perth Amboy, Solomon Andrews, ... 152.13
Burlington, Gershom Mott, 180.44
Little Egg Harbour, Samuel S. Downs, ... 300.00

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Salary.

Great Egg Harbour, Mahlon D. Canfield, ... $420.65
Bridgetown, Jas. G. Hampton, fees and 250.00
Newark, A. Gifford, fees and 250.00

PENNSYLVANIA.

Philadelphia, C. Blythe, .. 1,958.25
Presque Isle, C. W. Kelso, .. 399.58
Pittsburgh, Wm. B. Mowry,* 500.00

DELAWARE.

Wilmington, A. Naudain, .. 593.28

MARYLAND.

Baltimore, Nathaniel F. Williams, ... 1,668.44
Annapolis, Richard Sands, 1,263.31
Oxford, Nicholas Willis, ... 250.00
Vienna, B. H. Crockett, ... 499.34
Llewellensburgh, Aloysius Thompson,* 200.00
Town Creek, Lewis Stone,* 150.00

DISTRICT OF COLUMBIA.

Georgetown, H. Addison, .. 565.62
Alexandria, George Brent, .. 753.12

VIRGINIA.

Tappahannock, J. A. Parker, ... 477.68
Richmond, Thos. Nelson, .. 1,787.69
Petersburg, Hugh Nelson, .. 338.79
Yeocomico, Gordon Forbes,* 215.65
Yorktown, Wm. Nelson, ... 200.00
Cherry Stone, P. S. Bowdoin, 250.00
Wheeling, Saml. Atkinson,* 350.00
Norfolk and Portsmouth, Conway Whittle, ... 1,922.04

NORTH CAROLINA.

Camden, Geo. W. Charles, fees and 250.00
Edenton, Thos. J. Charlton, 268.84
Plymouth, J. Ramsey, ... 408.77
Washington, T. H. Blount, .. 465.21
Newbern, T. S. Singleton, .. 483.54
Ocracoke, S. Brown, ... 1,009.11
Beaufort, J. E. Gibble, ... 196.60
Wilmington, M. V. Jones, .. 338.07

SOUTH CAROLINA.

Salary.

Charleston, W. J. Grayson, ... $1,328.00
Georgetown, T. L. Shaw, .. 652.19
Beaufort, Benj. R. Bythwood, ... 250.00

GEORGIA.

Savannah, Edward Hardin, 2,326.40
St. Mary's, Archibald Clark, 708.17

ALABAMA.

Mobile, C. H. Minge, ... 3,400.00

MISSISSIPPI.

Pearl River, W. H. Arnold, 250.00
Natchez, John D. Elliott, ... 200.00
Vicksburg, E. H. Taylor, .. ———

LOUISIANA.

New Orleans, Thomas Barrett, ... 6,400.00
Teche, Geo. Royster, ... 986.33

TENNESSEE.

Nashville, Joseph Litton,* .. 444.00

KENTUCKY.

Louisville, N. P. Porter,* .. 485.00

OHIO.

Cuyahoga, Wm. Milford, .. 671.59
Miami, James H. Forsyth, .. 325.46
Cincinnati, Isaiah Wing,* .. 459,66
Sandusky, Elias H. Haines, 409.04

MISSOURI.

St. Louis, Oliver Harris,* .. 600.00

MICHIGAN.

Detroit, Edward Brooks, ... 720.00
Michilimackinac, Samuel K. Haring, ... 835.84

FLORIDA.

Pensacola, R. Mitchell, .. 2,554.16
St. Johns, J. Dell, fees and 500.00
Apalachicola, H. Nourse, .. 1,500.00
St. Augustine, Augustus W. Walker, fees and 602.56
St Marks, Wm. H. Ware, fees and 758.16
Key West, A. Gordon, ... 2,068.73

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WAR DEPARTMENT.

The following list of Officers was corrected at the War Department, June 28, 1844.

	Salary.
William Wilkins, *Secretary of War*,	$6,000
Daniel Parker, *Chief Clerk*,	2,000

CIVIL BUREAUS.

INDIAN OFFICE.

Commissioner.

	Salary.
T. Hartley Crawford,	3,000
Sam'l H. Porter, *Chief Clerk*,	1.600

PENSION OFFICE.

Commissioner.

	Salary.
James L. Edwards,	2,500
Geo. W. Crump, *Chief Clerk*,	1,600

MILITARY BUREAUS OF THE WAR DEPARTMENT.

Quartermaster's Bureau.

T. S. Jesup, Bvt. Maj. Gen. and Q. M. Gen.
A. R. Hetzel, Capt. & Ass't Qr. Mr.
W. A. Gordon, Prin. Clerk, $1,600

Clothing and Equipage Bureau, Phila., under the Qr. Mr. Gen.

H. Stanton, Col. & Ass't Q. M. G.

Engineer Bureau.

J. G. Totten, Col. & Chf. Eng'r.
Geo. L. Welcker, Lieut. & Ass't Eng'r.
Benj. Fowler, Prin. Clerk, $1,200

Topographical Bureau.

J. J. Abert, Col. & Ch'f of corps.
W. K. Swift, Capt. and Ass't.
G. Thompson, Prin. Clerk, $1,400

Ordnance Bureau.

Geo. Talcott, Lieut. Col. Ord.
W. Maynadier, Capt. & Ass't.
Geo. Bender, Prin. Clerk, $1,200

Pay Bureau.

N. Towson, Bvt. Brig. Gen. & Pay Mr. Gen.
Nath'l Frye, Prin. Clerk, $1,700

Subsistence Bureau.

Geo. Gibson, Bvt. Brig. Gen. & Com. Gen. Sub.
John C. Casey, Capt. & Ass't.
Richard Gott, Prin. Clerk, $1,600

Medical and Surgical Bureau.

Thomas Lawson, Surgeon General.
H. L. Heiskell, Surgeon & Assistant.
R. Johnson, Prin. Clerk, $1,150

Head Quarters of the Army U. S.

Washington.

Maj. Gen. Winfield Scott, *Gen. in Chief.*
1st Lieut. H. L. Scott, *Aide-de-Camp.*
1st Lieut. T. Williams, *Aide-de Camp.*
Bvt. Brig. Gen. Roger Jones, *Adj't. Gen.*
Bvt. Maj. L. Thomas, *Ass't. Adj't. Gen.*
Bvt. Capt. W. G. Freeman, *Ass't Adj't. Gen.*
1st Lieut. S. C. Ridgely, *Acting Judge Advocate.*

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AGENTS FOR PAYING PENSIONS IN THE SEVERAL STATES AND TERRITORIES. (NO COMPENSATION IS ALLOWED FOR THE PERFORMANCE OF THIS SERVICE.)

Wm. Woodbury, *Portland, Me.*
Isaac Hill, *Concord, N. H.*
Richard Jenness, *Portsmouth, N. H.*
Paris Hill, *Providence, R. I.*
Thomas Reed, *Montpelier, Vt.*
John Peck, *Burlington, Vt.*
Franklin Haven, *Boston, Mass.*
H. Goodwin, 2d, *Hartford, Conn.*
John A. Stevens, *New York.*
Thos. W. Olcott, *Albany, N. Y.*
P. Dickinson, *Trenton N. J.*
Sam'l F. Smith, *Philadelphia.*
Thos. W. Howe, *Pittsburg, Pa.*
Jacob Alrichs, *Wilmington, Del.*
James Swan, *Baltimore, Md.*
J. W. Pegram, *Richmond, Va.*
Anthony Robinson, Sr., *do.*
J. Steen Brown, *Wheeling, Va.*
John Huske, *Fayetteville, N. C.*
J. C. Cochran, *Charleston, S. C.*
Hugh W. Mercer, *Savannah, Geo.*
G. W. Meriwether, *Louisville, Ky.*
Joel M. Smith, *Nashville, Tenn.*
Wm. K. Blair, *Jonesboro, Tenn.*
Thomas Martin, *Pulaski, Tenn.*
John T. King, *Knoxville, Tenn.*
John W. Campbell, *Jackson, Tenn.*
James Hall, *Cincinnati, Ohio.*
Isaac McFarran, *Jackson, Miss.*
James Perrine, *Mobile, Ala.*
B. M. Lowe, *Huntsville, Ala.*
Jas. H. Dearing, *Tuscaloosa, Ala.*
W. C. Anderson, *St. Louis, Mo.*
J. F. D. Lanier, *Madison, Ind.*
M. C. Fitch, *New Albany, Ind.*
John Dawson, *Springfield, Ill.*
E. P. Hastings, *Detroit, Mich.*
W. E. Woodruff, *Little Rock, Ark.*
Pierce M. Butler, *Fort Gibson, Ark.*
F. H. Flagg, *Tallahassee, Flor.*
A. M. Reed, *Jackson, Flor.*
Geo. W. Jones, *Sinsinawa Mound, Wisconsin*, agent for paying pensions in Iowa.
J. P. Van Ness, *Washington, D. C.*
Greenberry Dorsey, *N. Orleans, La.*
Paraclete Potter, *Milwaukie, Wisconsin.*

GENERAL OFFICERS.

Winfield Scott, *Major General.*
Edmund P. Gaines, *Brig. General, Maj. Gen. Brevet.*
John E. Wool, *Brigadier General.*

MILITARY GEOGRAPHICAL DEPARTMENTS.

(*As established by a General Order, dated July 12th,* 1842.)

Department No. 1.—West Florida, and the States of Alabama, Mississippi, Louisiana, Tennessee and Kentucky. Head Quarters, from the 1st of November to the 30th of June, in each year, at New Orleans, and for the remainder of the year at the Bay of St. Louis, or Baton Rouge, as the commander may elect.

Department No. 2.—The country west of the Mississippi, north of Louisiana and Texas, and south of the 37th degree of north latitude. Head Quarters, Fort Smith.

Department No. 3.—The State of Missouri, (above the 37th degree of north latitude,) the State of Illinois, the Iowa Territory, that part of the Wisconsin Territory west of the 13th degree of longitude west from

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Washington, and the Indian country north and west of the lines indicated. Head Quarters, Jefferson Barracks.

DEPARTMENT No. 4.—The States of Indiana, Ohio and Michigan, the part of the Wisconsin Territory not included in Department No. 3, and the Indian country north. Head Quarters, Detroit.

DEPARTMENT No. 5.—The States of Pennsylvania, New York, Vermont, New Jersey, Connecticut and Rhode Island. Head Quarters, Troy, New York.

DEPARTMENT No. 6.—The States of Massachusetts, New Hampshire and Maine. Head Quarters, Portland.

DEPARTMENT No. 7.—The States of Delaware, Maryland and Virginia. Head Quarters, Fort Monroe.

DEPARTMENT No. 8.—The States of North Carolina, South Carolina and Georgia. Head Quarters, Sullivan's Island, harbour of Charleston.

DEPARTMENT No. 9.—(Temporary.) East and Middle Florida. Head Quarters in the field.

MILITARY ACADEMY, WEST POINT, (N. Y.)

(*From Reports communicated to Congress by the Secretary of War, January* 30, 1844.)

Number of Cadets admitted into the Academy, from its establishment, to January 1, 1844,	2,942
Number who have graduated, to Jan. 1, 1844	1,206
To be graduated in June, 1844,	25
Total	1,231
In service at the present time	542
Aggregate amount of appropriations for the Academy, from its establishment to June 30th, 1844,	$4,002,901.15

NAVY DEPARTMENT.

(*From the Navy Register for* 1844.)

	Salary.
John Y. Mason, *Secretary*,	$6,000
A. Thomas Smith, *Chief Clerk*,	2,000
Benjamin Homans, *Principal Corresponding Clerk*,	1,500
Lauriston B. Hardin, *Registering Clerk*,	1,400
Samuel A. Allen, *Warrant Clerk*,	1,200

BUREAU OF YARDS AND DOCKS.

	Salary.
Lewis Warrington, *Chief*,	$3,500
Wm. G. Ridgely, *Chief Cl'k.*	1,400
W. P. S. Sanger, *Civil Engineer*,	$2,000
G. F. De la Roche, *Draughtsman*,	$1,000

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NAVY DEPARTMENT.

BUREAU OF ORDNANCE AND HYDROGRAPHY.

	Salary.
Wm. M. Crane, *Chief*,	$3,500
Gustavus Harrison, *Clerk*,	1,200
C. Schwarz, *Draughtsman*,	1,000

BUREAU OF CONSTRUCTION, EQUIPMENT AND REPAIRS.

Charles Morris, *Chief*,	3,000
B. M. Voorhees, *Chief Clerk*,	1,400
C. Humphreys, *Draughtsm'n*,	1000

BUREAU OF PROVISIONS AND CLOTHING.

W. B. Shubrick, *Chief*,	$3,000
Wm. S. Parrott, *Chief Clerk*,	1,400

BUREAU OF MEDICINE AND SURGERY.

Thomas Harris, *Chief*,	2,500
C. F. B. Guillou, *Assistant*,	1,400
Moses Poor, *Clerk*,	1,200

LISTS

Of the Captains, Commanders, Lieutenants, Surgeons, Passed Assistant Surgeons, Assistant Surgeons, Pursers, Chaplains, Passed Midshipmen and Midshipmen of the United States Navy, in their lineal rank.

CAPTAINS (68.)

James Barron	1
Charles Stewart	2
Jacob Jones	3
Charles Morris	4
Lewis Warrington	5
William M. Crane	6
James Biddle	7
Charles G. Ridgely	8
John Downes	9
Jesse D. Elliott	10
Stephen Cassin	11
James Renshaw	12
Alex. S. Wadsworth	13
George C. Read	14
Henry E. Ballard	15
Alexander J. Dallas	16
John B. Nicolson	17
Jesse Wilkinson	18
T. Ap Catesby Jones	19
Wm. Compton Bolton	20
William B. Shubrick	21
Charles W. Morgan	22
Lawrence Kearny	23
Foxhall A. Parker	24
Edward R. McCall	25
Daniel Turner	26
David Conner	27
William M. Hunter	28
John D. Sloat	29
Matthew C. Perry	30
Charles W. Skinner	31
John Thomas Newton	32
Joseph Smith	33
Lawrence Rousseau	34
George W. Storer	35
Francis H. Gregory	36
Philip F. Voorhees	37
Benjamin Cooper	38
David Geisinger	39
Robert F. Stockton	40
Isaac McKeever	41
John P. Zantzinger	42
William D. Salter	43
Charles S. McCauley	44
Thomas M. Newell	45
Elie A. F. Lavallette	46
Thomas T. Webb	47
John Percival	48
John H. Aulick	49
William V. Taylor	50
Bladen Dulany	51
Silas H. Stringham	52
Isaac Mayo	53
William Mervine	54
Thomas Crabb	55

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Thomas Paine 56
James Armstrong 57
Joseph Smoot.....58
Samuel L. Breese 59
Benjamin Page 60
John Gwinn.....61
Thomas W. Wyman.....62
Andrew Fitzhugh 63
William K. Latimer 64
Hiram Paulding.....65
Uriah P. Levy 66
Charles Boarman 67
French Forrest.....68

COMMANDERS (97.)

William Jamesson..... 1
Charles Gauntt..... 2
William Ramsay 3
Henry Henry..... 4
Samuel W. Downing..... 5
Henry W. Ogden..... 6
Thomas A. Conover..... 7
John C. Long..... 8
John H. Graham 9
James M. McIntosh.....10
Josiah Tatnall 11
Hugh N. Page.....12
William Inman 13
Stephen Champlin.....14
Joel Abbot 15
Lewis E. Simonds.....16
John M. Dale.....17
Harrison H. Cocke 18
William J. McCluney.....19
John B. Montgomery.....20
Horace B. Sawyer.....21
Cornelius B. Stribling.....22
Joshua R. Sands.....23
John J. Young 24
Charles H. Bell 25
Abraham Bigelow 26
Frederick Varnum.....27
Joseph R. Jarvis 28
Thomas W. Freelon.....29
Samuel W. Le Compte.....30
Charles T. Platt 31
Wm. M. Armstrong.....32
William F. Shields.....33
Garret J. Pendergrast.....34
William C. Nicholson.....35
James B. Cooper 36
Ed. W. Carpender.....37
John L. Saunders.....38
Joseph B. Hull.....39
John Stone Paine.....40
Joseph Morehead.....41
Thomas Petigru.....42
John S. Chauncey 43
Irvine Shubrick.....44
John Kelly.....45
Edmund Byrne.....46
William H. Gardner.....47
David G. Farragut.....48
Richard S. Pinckney.....49
Stephen B. Wilson 50
Edward C. Rutledge.....51
William S. Harris.....52
Thomas Aloysius Dornin.....53
Robert B. Cunningham.....54
James Glynn 55
Joseph Myers.....56
William C. Wetmore 57
Thomas R. Gedney.....58
John Bubier 59
Victor M. Randolph.....60
Jacob Crowninshield 61
Frederick Engle 62
John Rudd 63
Robert Ritchie.....64
William W. McKean.. 65
Franklin Buchanan 66
Samuel Mercer 67
Charles Lowndes.....68
L. M. Goldsborough 69
George N. Hollins.....70
Duncan N. Ingraham.....71
John Marston 72
Henry Bruce 73
William D. Newman.....74
Henry A. Adams.....75
James D. Knight.....76
Joseph Mattison.....77
William S. Walker.....78
Alexander S. Mackenzie 79
George F. Pearson.....80
James T. Gerry.....81
John S. Nicholas.....82
Samuel F. Du Pont.....83
William L. Hudson.....84
James P. Wilson.....85
George A. Magruder.....86
John Pope.....87

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Levin M. Powell.....88
Charles Wilkes.....89
Elisha Peck.....90
Thomas J. Manning.....91
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1826.

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John W. West..... 6
Henry Eagle..... 7
Andrew K. Long..... 8
G. J. Van Brunt..... 9
Henry Pinkney.....10
William M. Glendy.....11
John H. Little.....12
George P. Upshur.....13
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Zach. F. Johnson.....15
William Green.....16
Samuel Barron.....17
Timothy G. Benham.....18
Alexander G. Gordon.....19
Albert G. Slaughter.....20
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Wm. P. C. Barton..... 2
Thomas Harris..... 3
William Turk 4
John A. Kearney..... 5
Bailey Washington 6
William Swift 7
Thomas B. Salter..... 8
Peter Christie 9
Samuel Jackson.....10
Thomas Williamson 11
Benajah Ticknor 12
James Cornick.....13
Charles Chase 14
David S. Edwards 15
Isaac Hulse 16
John S. Wily.....17
George Terrill.....18
John Haslett.....19
Edmund L. DuBarry.....20
Waters Smith 21
Benjamin F. Bache 22
Thomas Dillard 23
Stephen Rapalje 24
James M. Greene.....25
Benjamin R. Tinslar.....26
George W. Codwise 27
Gustavus R. B. Horner.....28
W. S. W. Ruschenberger.....29
William Johnson..... ..30
Samuel Moseley 31
Robert J. Dodd.....32
Wm. Fairlie Patton.....33
John F. Brooke 34
William Whelan.....35
Samuel Barrington 36
Thomas L. Smith 37
George Blacknall.....38
Hor'o. N. Glentworth 39
Lewis B. Hunter.....40
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George B. McKnight.....47
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Amos G. Gambrill.....50
W. A. W. Spotswood.....51
Jonathan M. Foltz.....52
Samuel C. Lawrason.....53
Edward Gilchrist.....54
John A. Lockwood.....55
Daniel C. McLeod.....56
Lewis Wolfley.....57
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William J. Powell.....59
J. Frederick Sickles.....60
N. C. Barrabino.....61
Henry S. Reynolds.....62
M. G. Delaney.....63
Wm. F. McClenahan.....64
Wm. L. Van Horn.....65
Daniel S. Green.....66
James C. Palmer.....67
Ninian Pinkney.....68
Robert T. Barry.....69

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John R. Elliott..... 1
Charles A. Hassler..... 2
David Harlan..... 3
Victor L. Godon..... 4
Robert Woodworth..... 5
J. Dickinson Miller..... 6
John L. Fox..... 7
Charles F. B. Guillou..... 8
Augustus J. Bowie..... 9
Joseph Beale.....10
S. Wilson Kellogg.....11
John T. Mason.....12
Charles D. Maxwell.....13
Edward J. Rutter.....14
John J. Abernethy.....15
J. Malcom Smith.....16
J. Winthrop Taylor.....17
James Monroe Minor.....18
Silas Holmes.....19
J. Howard Smith.....20
Horace D. Taliaferro.....21
James J. Brownlee.....22
John S. Whittle.....23

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John S. Messersmith..... 1
J. W. B. Greenhow..... 2
George Maulsby..... 3
Charles J. Bates..... 4
William Grier..... 5
E. H. Van Wyck..... 6
James McClelland..... 7
Samuel R. Addison..... 8
William B. Sinclair..... 9
Samuel Jackson.....10
Joshua Huntington.....11
Robert B. Banister.....12
Augustus F. Lawyer.....13
Stephen A. McCreery.....14
J. O'Connor Barclay.....15
James B. Gould.....16
C. H. Wheelwright.....17
Richard W. Jeffery.....18
Thomas M. Potter.....19
William A. Nelson.....20
John H. Wright.....21
Joseph Hopkinson.....22
John Thornley.....23
Daniel L. Bryan.....24
Andrew A. Henderson.....25
John Hastings.....26
Richard T. Maxwell.....27
Alexander Y. P. Garnett.....28
Morris B. Beck.....29
J. Francis Tuckerman.....30
Oscar F. Baxter.....31
Lewis J. Williams.....32
Marius Duvall.....33
William S. Bishop.....34
Joseph Wilson, Jr.....35
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Edward Hudson.....38
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Francis A. Thornton..... 2
Edward Fitzgerald..... 3

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James H. Clark 5
Joseph Wilson 6
William Sinclair 7
John N. Todd 8
Joseph H. Terry 9
Thomas Breese 10
John de Bree 11
Charles O. Handy 12
Edward N. Cox 13
John N. H mbleton.....14
Garrett R. Barry 15
D. McC. F. Thornton.....16
Dudley Walker 17
McKean Buchanan 18
Henry Etting 19
Francis B. Stockton.....20
Francis G. McCauley 21
Nathaniel Wilson 22
Benjamin J. Cahoone 23
Sterrett Ramsey 24
Edward T. Dunn.....25
John A. Bates.....26
Andrew J. Watson 27
William A. Bloodgood.....28
Daingerfield Fauntleroy.....29
T. Marston Taylor 30
Adol. Eugene Watson.....31
Joseph Bryan 32
Samuel Forrest 33
Robert Pettit 34
Philo White.....35
Richard R. Waldron.....36
William Speiden.....37
Horatio Bridge.....38
George F. Sawyer.....39
John C. Holland.....40
Hugh W. Greene 41
Thomas B. Nalle.....42
Christopher C. Rice 43
Thomas P. McBlair.....44
Edward Bissell.....45
Thomas E. Norris 46
John D. Gibson.....47
John B. Rittenhouse 48
Edward Storer 49
Rodman M. Price.....50
Andrew D. Crosby.....51
Lewis Warrington, Jr.....52
Robert S. Moore 53
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Addison Searle 1
John W. Grier..... 2
Charles S. Stewart..... 3
William Ryland..... 4
Timothy J. Harrison..... 5
Walter Colton 6
George Jones..... 7
Thomas R. Lambert 8
Peter G. Clark..... 9
J. P. B. Wilmer.....10
Rodman Lewis.....11
Fitch W. Taylor 12
Charles Henry Alden 13
Mortimer R. Talbot 14
Moses B. Chase.....15
Chester Newell 16
Theodore Bartow.....17
Joseph Stockbridge 18
William McKenney 19
Photius Kavasales 20
William G. Jackson.....21
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1839.

John Cassin Henry 1
William A. Wayne..... 2
James S. Biddle..... 3
C. R. Perry Rodgers..... 4
James Withers Read..... 5
Washington A. Bartlett..... 6
Francis Winslow..... 7
James C. Williamson..... 8
Gough W. Grant..... 9
Cornelius Vanalstine.....10
Albert G. Glary.....11
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John S. Neville 15
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John B. Randolph 17
Johnston B. Carter.....18
Samuel Pearce.....19
Henry P. Robertson 20

1840.

Isaac N. Brown 21
R. Delancey Izard.....22
Napoleon Collins 23
John L. Worden 24
William L. Blanton.....25
Benjamin S. Gantt.....26
Henry A. Wise 27
Callender St. G. Noland.....28
Edward C. Anderson.....29
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William H. Macomb.....31
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Charles W. Aby,
Richmond Aulick,
William D. Austin,
James Armstrong,
Albert Allmand,
Alexander R. Abercrombie,
Elijah T. Andrews,
Lehman P. Ashmead.

B.

Wesley Wheeler Basset,
Charles Henry Baldwin,
James D. Bullock,
Julius S. Bohrer,
Lewis Beard,
Joseph M. Bradford,
James L. S. Beckwith,
John W. Bennett,
Homer C. Blake,
Frederick B. Brand,
Edward Brinley, Jr.
Edward Barrett,
William King Bridge,
Alfred Bailey,
John R. Barker,
H. G. D. Brown,
Allen T. Byrens,
Thomas W. Brodhead,
John M. Brooke,
Charles S. Bell,
Washington P. Buckner,
Oscar C. Badger,
Joseph T. Bartlett,
Simeon S. Bassett,
Frederick P. Baldwin,
John T. Barraud,
George H. Bier,
Josiah S. Byers,
Sylvanus J. Bliss,

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Charles C. Bayard.

C.

Edmund Ross Colhoun,
Richard M. Cuyler,
Henderson A. Colborn,
Samuel P. Carter,
John Q. A. Crawford,
Jonathan H. Carter,
Francis S. Conover,
William S. Cushman,
Charles F. Collins,
Greenleaf Cilley,
Cornelius Comegys,
Edward T. Carmichael,
Gideon D. Chenoweth,
Horace N. Crabb,
David Coleman,
David A. Cheever,
Joseph J. Cook,
Francis G. Clark, Jr.
Walter O. Crain,
Albert G. Cook,
Robert R. Carter.

D.

Martin Duralde,
Joseph S. Day,
Alexander J. Dallas, Jr.
Charles Dyer, Jr.
Washington F. Davidson,
Garrit V. Denniston,
John L. Davis,
George M. Dibble,
William DeKoven,
George B. Douglass,
Ebenezer D. Denny,
Alexander Mosely de Bree,
Joseph D. Daniels,
J. Charles P. DeKrafft,
Joseph E. DeHaven,
Robert C. Duvall,
Adrian Deslonde,
Hunter Davidson,
Francis G. Dallas.

E.

Samuel B. Elliott,
Earl English,
Albert Gallatin Enos,
Thomas C. Eaton.

F.

Timothy W. Fiske,
Reginald Fairfax,
J. Malachi Ford,
Samuel R. Franklin,
William H. Fauntleroy,
Joseph A. Forrest,
James L. Ferguson,
Joseph Fry,
Thomas S. Fillebrown,
Joseph L. Friend.

G.

Francis Gregory,
William Gibson,
Edmund C. Genet,
William Marshall Gamble,
Samuel P. Griffin,
Edward Gordon,
Edward C. Grafton,
Charles K. Graham,
John Gale,
Charles Gray,
Walter V. Gilliss,
Stanwix Gansevoort.

H.

Henry H. Harrison,
Aaron K. Hughes,
Frederick M. Humphrey,
John R. Hinson,
James Higgins,
George W. Harrison,
William E. Hopkins,
Benjamin L. S. Henderson,
Edward A. Hopkins,
Reuben Harris,
John E. Hopson,
John P. Hall,
Washington Hammond,
John E. Hart,
Alexander W. Habersham,
Daniel C. Hugunin,
Thomas C. Harris,
Henry C. Hunter,
Frederick A. Hallett,
John J. Hanson,
William W. Holmes,
William G. Hoffman,
Milton Haxtun,
James Heron,
Charles F. Hopkins,
Philemon H. Haywood,
George H. Hare,
Gustavus Harrison,
Henry St. George Hunter,

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Edmund Wilkes Henry,
Charles C. Hunter.

J.

William N. Jeffers, Jr.
Alonzo C. Jackson,
Merriwether P. Jones,
James E. Jouett,
Elliott Johnston,
Walter F. Jones,
Copeland P. Jones,
James L. Johnston,
John P. Jones,
Andrew W. Johnson,
John H. Johnson.

K.

Peter Kemble,
Frederick Kellogg,
John Kell,
Henry H. Key,
George S. King.

L.

Lyman R. Law,
William Reed Low,
James M. Ladd,
Reigart B. Lowry,
Richard L. Law,
William W. Low,
Charles Latimer,
Theodoric Lee,
Leonard H. Lyne,
Robert F. R. Lewis,
Stephen B. Luce,
John Laurens,
John Devall Langhorne.

M.

John P. McFarland,
Julian Myers,
Leonidas McDougal,
Robert Milligan,
Richard P. Mason,
Tenant McLanahan,
Augustus McLaughlin,
James B. McCauley,
John Madigan, Jr.
Robert A. Marr,
Robert M. McArann,
John McL. Murphy,
George E. Morgan,
John V. McCollum,
Robert D. Minor,
Andrew F. Monroe,
Jefferson McRoberts,
Alexander J. Mitchell,
William H. Murdaugh,
Jefferson Maury,
Edward Y. McCauley,
Thomas J. Miller,
David P. McCorkle,
William Mitchell,
William K. Mayo,
Lucius M. Mason,
Charles P. McGary,
John Howard March,
Charles M. Mitchell,
David A. McDermut,
Samuel Magaw,
William R. Mercer,
Allen McLane.

N.

John L. Nelson,
Sommerville Nicholson,
William Nelson,
Jefferson H. Nones.

O.

David Ochiltree,
Arthur H. Otis,
Cyrus H. Oakly.

P

Thomas Pattison,
Thomas S. Phelps,
John Julius Pringle,
Henry O. Porter,
Leonard Paulding,
Edward C. Pasteur,
John Van Ness Philip,
Wingate Pilsbury,
Robert Patton,
Richard J. D. Price,
William L. Powell,
Dawson Phenix,
William H. Parker,
Seth Phelps,
Joseph Parrish.

Stephen P. Quackenbush,
Walter Queen.

R.

Alexander C. Rhind,
William W. Roberts,
Abner Read,
Beverley Randolph,
George M. Ransom,

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Robert Clay Rodgers,
Lawrence B. Robinson,
William Reily,
Thomas Roney,
Samuel B. Rathbone,
John H. Russell,
Francis A. Roe,
Edward Renshaw.

S.

Henry K. Stevens,
Robert W. Shufeldt,
John Stuart,
William F. Spicer,
Paul Shirley,
Charles Carroll Simms,
Maurice Simons,
Edward C. Stiles,
Edward Simpson,
Edward C. Stout,
Robert Savage,
George A. Stevens,
William Henry Smith,
Jesse M. Smith,
T. Brandford Shubrick,
Robert Selden,
Robert W. Scott,
John B. Stewart,
Byrd W. Stevenson,
William Sharp,
Stephen D. Spence,
James H. Somerville,
Alexander R. Simmons,
Edmund Shepherd,
Marshall J. Smith,
Edward H. Scovell,
Edward E. Stone,
Watson Smith,
Robert Stuart,
Joseph B. Smith,
Edward A. Selden,
George T. Simes,
Alexander A. Semmes,
Robert B. Storer,
Joseph Seawell.

T.

Colville Terrett,
William G. Tempie,
James S. Thornton,
William R. Thomas,
William Talbot Truxtun,
William P. Toler,
James L. Tillotson,
John H. Tillotson.

U.

John H. Upshur.

V.

Elias Vander Horst,
William Van Wyck,
Nicholas H. Van Zandt.

W.

William Augustine Webb,
George Edward West,
James Wilcoxson,
Samuel Wilcox,
Peter Wager, Jr.
Alexander F. Warley,
John Walcutt,
James Wiley,
Frederick P. Wheelock,
Charles Waddell,
George P. Welsh,
Clark H. Wells,
William H. Wilcox,
William C. West,
Nathaniel T. West,
John T. Walker,
William D. Whiting,
John K. Wilson,
John Wilkes, Jr.
John G. Whitaker,
James J. Waddell,
Henry Willis,
Theodoric L. Walker,
Pendleton G. Watmough,
Thomas B. Wainwright,
Benjamin F. Wells,
William H. Weaver,
Archibald H. Waring,
William W. Wilkinson,
Charles Woolley,
Ellicott D. Wall.

Y.

Jonathan Young,
George W. Young,
Thomas Young,
James B. Yates.

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MARINE CORPS.

Colonel Commandant.

Arch'd. Henderson.

Lieutenant Colonel.

Samuel Miller.

Majors, 4.

Samuel E. Watson.
William H. Freeman.
Levi Twigga.
John Harris.

Captains, 13.

Thomas A. Linton.
James Edelin.
Park G. Howle, *Adj. & Inspector.*
William Dulany.
Thomas S. English.
Geo. W. Walker, *Paymaster.*
Ward Marston.
A. A. Nicholson, *Quartermaster.*
Benjamin Macomber.
Abraham N. Brevoort.
Richard Douglas.
Job G. Williams.
Alvin Edson.

First Lieutenants, 20.

Henry B. Tyler.
Jos. L. C. Hardy.
Geo. F. Lindsay, *Ass't. Q.master.*
Landen N. Carter.
John G. Reynolds.
Francis C. Hall.
George H. Terret.
William E. Stark.
Nathaniel S. Waldron.
William Lang.
Jacob Zeilin.
George W. Robbins.
Daniel D. Baker.
Archibald H. Gillespie.
Benjamin E. Brooke.
Jabez C. Rich.
Thomas Theodore Sloan.
Addison Garland.
Frederick B. McNeil.
Edw. Lloyd West.

Second Lieutenants, 20.

Robert C. Caldwell.
William L. Young.
Josiah Watson.
Henry B. Watson.
Thomas A. Brady.
Isaac T. Doughty.
William A. T. Maddox.
William B. Slack.
John S. Devlin.
Algernon S. Taylor.
William L. Shuttleworth.
Robert D. Taylor.
Joseph W. Curtis.
Robert Tansill.
John Contee Grayson.
Matthew R. Kintzing.
John D. Simms, Jr.
Henry W. Queen.
Daniel J. Sutherland.
William W. Russell.

CIVIL BRANCH.

NAVY AGENTS, 14.

Timothy Upham, Portsmouth, N. H.
J. Vincent Browne, Boston.
James H. Suydam, New York.
Thomas Hayes, Philadelphia.
Samuel McClellan, Baltimore.
William B. Scott, Washington.
George Loyall, Norfolk.
Benj. D. Heriot, Charleston, S. C.
William Mackay, Savannah.
Jackson Morton, Pensacola.
Baring, Brothers & Co., London.
Fitch, Brothers & Co., Marseilles.
Wm. P. Furniss & Co., St. Thomas, West Indies.
Edward McCall & Co., Lima.

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NAVAL STOREKEEPERS, (12.)

	Salary.
Charles W. Cutter, Portsmouth, N. H.	$1,400
Seth J. Thomas, Boston,	1,700
Tunis Craven, New York,	1,700
Robert Kennedy, Philadelphia,	1,250
James M. Selden, Washington,	1,700
Merit Jordan, Norfolk,	1,700
Robert Joyner, Pensacola,	1,700
Obadiah Rich, Port Mahon,	1,500
Llewellyn Jones, Rio de Janeiro,	1,500
Floyd Waggaman, Port Praya, Cape de Verds,	1,500
Thomas W. Waldron, Hong Kong, E. I.	1,500
Edward S. Benson, Sandwich Islands,	$1,200

NAVAL CONSTRUCTORS' DEPARTMENT.

Chief Naval Constructor.

Samuel Humphreys, Washington,	3,000

Naval Constructors, (7.)

Samuel M. Pook, Portsmouth, N. H.	2,300
Josiah Barker, Boston,	2,300
Samuel Hartt, Erie, Pennsylvania,	2,300
John Lenthall, Philadelphia,	2,300
Foster Rhodes, New York,	2,300
Francis Grice, Norfolk,	2,300
Charles D. Brodie, Pensacola,	1,500

DEPOT OF CHARTS AND INSTRUMENTS.

LIEUTENANTS.

Matthew F. Maury, *Superintendent.*
William Chandler.
William L. Herndon.
Richard Forrest.

PASSED MIDSHIPMEN.

J. H. Adams.
Maxwell Woodhull.
George Wells.
J. B. Randolph.
James L. Blair.
T. H. Patterson.

SALARIES OF THE NAVAL OFFICERS.

CAPTAINS—(68.)

	Pay per annum.
Senior Captain, in service,	$4,500
do. do. on leave, &c.	3,500
Captains of Squadrons,	4,000
do. on other duty,	3,500
do. off duty,	2,500

COMMANDERS—(97.)

Commanders, in sea service,	2,500
do. at navy yards or on other duty,	2,100
do. on leave, &c.	1,800

LIEUTENANTS—(328.)

Lieutenants, commanding,	1,800

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	Pay per annum.
Lieutenants, on other duty,	$1,500
do. waiting orders,	1,200

SURGEONS—(69.)

Surgeons, 1st 5 years after date of commission,	1,000
do. do. at navy yards, &c.	1,250
do. do. in sea service,	1,333.33⅓
do. do. of the fleet,	1,500
do. 2d 5 years,	1,200
do. do. at navy yards, &c.	1,500
do. do. in sea service,	1,600
do. do. of the fleet,	1,800
do. 3d 5 years,	1,400
do. do. at navy yards,	1,750
do. do. in sea service,	1,866.66⅔
do. do. of the fleet,	2,100
do. 4th 5 years,	1,600
do. do. at navy yards, &c.	2,000
do. do. in sea service,	2,133.33⅓
do. do. of the fleet,	2,400
do. 20 years and upwards,	1,800
do. do. at navy yards, &c.	2,250
do. do. in sea service,	2,400
do. do. of the fleet,	2,700

PASSED ASSISTANT SURGEONS—(23.) ASSISTANT SURGEONS—(44.)

Assistant Surgeons waiting orders,	650
do. do. at sea,	950
do. do. after passing, &c.	850
do. do. at sea, after passing,	1,200
do. do. at navy yards, &c.	950
do. do. at navy yards, after passing,	1,150

PURSERS—(64.)

Pursers, of ships of the line,	3,500
do. of frigates, or razees,	3,000
do. of sloops or steamers of 1st class,	2,000
do. of brigs, and schooners, and steamers, less than 1st class,	1,500
do. of navy yards, Boston, New York, Norfolk, and Pensacola,	2,500
do. of navy yards, Portsmouth, Philadelphia, and Washington,	2,000
do. of naval stations within the United States,	1,500
do. of receiving ships at Boston, New York, and Norfolk,	2,500
do. of other places,	1,500
do. on leave, and waiting orders, the same pay as Surgeons.	

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CHAPLAINS—(22.)

	Pay per annum.
Chaplains, in sea service,	$1,200
do. do. on leave, &c.	800

PASSED MIDSHIPMEN—(169.)

Passed Midshipmen, on duty,	750
do. do. waiting orders,	600

MIDSHIPMEN—(321.)

Midshipmen, in sea service,	400
do. on other duty,	350
do. on leave, &c.	300

MASTERS—(30.)

Masters of a ship of the line at sea,	1,100
do. on other duty,	1,000
do. on leave,	750

MASTER'S MATES, (warranted)—(12.)

Master's Mates, on duty,	450
do. on leave, &c.	300

PROFESSORS OF MATHEMATICS AND TEACHERS AT NAVAL SCHOOLS, &c.

Professors of Mathematics, on duty, 22,	1,200
Teachers at Naval Schools, 3,	480*
Boatswains—32 } of a ship of the line,	750
Gunners—39 } of a frigate,	600
Carpenters—35 } on other duty,	500
Sailmakers—33 } on leave, &c.	360

MARINE CORPS.

Colonel Commandant, 1, $75 per month, 12 rations per day, (20 cts. each.)

Lieutenant Colonel, 1,	60	do.	5	do.
Majors, 4,	50	do.	4	do.
Captains, †13,	40	do.	4	do.
First Lieutenants, 20,	30	do.	4	do.
Second Lieutenants, 20,	25	do.	4	do.

Note.—One ration per day, only, is allowed to all officers when attached to vessels for sea service.

* Teachers receive, in addition, two rations per day, at 20 cents each.
† Three of these Captains are in the staff; and receive pay as Majors.

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OFFICERS, &c. NOT NAMED ABOVE.

Grade.	Pay per annum.
Secretaries to commanders of squadrons commanding in chief,	$1,000
do. not commanding in chief,	900
Clerk of a yard, or commandant of a yard,	900
do. second to a commandant of a yard,	750
do. to commanders of squadrons, captains of fleets, and commanders of vessels,	500

	Pay per month.
Master's mates, not being warrant officers,	$25
Yeomen, in ships of the line,	40
do. in frigates,	35
do. in sloops of war,	25
do. in schooners,	18
Boatswains' mates,	19
Gunners' mates,	19
Carpenters' mates,	19
Master-at-arms,	19
Ship's cook,	18
Quartermasters,	18
*Firemen,	30
*Coal-heavers,	18
Quarter gunners,	15
Captains of forecastle,	18
Captains of tops,	15
Coxswain,	18
Armorer,	18
Cooper,	15
Ship's steward,	18
Officer's steward,	18
Surgeon's steward,	18
Sailmakers' mates,	15
Captains of hold,	15
Officers' cooks,	15
Ship corporals,	15
Master of the band,	18
Seamen,	12
Ordinary seamen,	10
Musicians, first class,	12
Musicians, second class,	10
Landsmen,	9
Boys,	8 to 6

* One ration per day.

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VESSELS OF WAR OF THE UNITED STATES NAVY.

Ships of the Line, 10.

Pennsylvania	120
Franklin	74
Columbus	74
Ohio	74
North Carolina	74
Delaware	74
Alabama	74
Vermont	74
Virginia	74
New York	74

Razee, 1.

Independence	54

Frigates, 1st Class, 12.

United States	44
Constitution	44
Potomac	44
Brandywine	44
Columbia	44
Congress	44
Cumberland	44
Savannah	44
Raritan	44
Santee	44
Sabine	44
St. Lawrence	44

Frigates, 2d Class, 2.

Constellation	36
Macedonian	36

Sloops of War, 23.

Saratoga	20
John Adams	20
Boston	20
Vincennes	20
Warren	20
Falmouth	20
Fairfield	20
Vandalia	20
St. Louis	20
Cyane	20
Levant	20
Portsmouth	20
Albany	
Germantown	
St. Mary's	
Plymouth	20
Jamestown	20
Ontario	18
Decatur	16
Preble	16
Yorktown	16
Marion	16
Dale	16

Brigs, 7.

Dolphin	10
Porpoise	10
Somers	10
Truxtun	10
Bainbridge	10
Perry	10
Oregon	
Lawrence	10

Schooners, 8.

Shark	10
Enterprise	10
Boxer	10
Experiment	
Flirt	
Wave	
Phenix	
On-ka-hy-e	

Steamers, 5.

Mississippi	10
Fulton	4
Union	
Princeton	
Poinsett	

Store Ships and Brigs, 7.

Relief	6
Erie	8
Lexington	8
Pioneer	
Michigan	
Colonel Harney	
General Taylor	

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POST-OFFICE DEPARTMENT.

(*The following List of Officers was corrected at the Post-Office Department, July* 9, 1844.)

	Salary.
Charles A. Wickliffe, *Postmaster General*,	$6,000
Selah R. Hobbie, *Assistant Postmaster General*,	2,500
J. Washington Tyson, *do.* *do.* *do.*	2,500
John S. Skinner, *do.* *do.* *do.*	2,500
John Marron, *Chief Clerk*,	2,000

DISTRIBUTING POST-OFFICES.

States.	Offices.
Maine,	Portland.
Massachusetts,	Boston.
Rhode Island,	Providence.
Connecticut,	Hartford.
New York,	New York, Albany, and Buffalo.
Pennsylvania,	Philadelphia, Northumberland, Erie, and Pittsburg.
Maryland,	Baltimore.
District of Columbia,	Washington.
Virginia,	Petersburg, Norfolk, Abingdon, and Wheeling.
North Carolina,	Raleigh and Ashville.
South Carolina,	Charleston, and Yorkville.
Georgia,	Augusta, Savannah, and Columbus.
Alabama,	Huntsville, and Tuscumbia.
Mississippi,	Natchez, and Vicksburg.
Louisiana,	New Orleans.
Tennessee,	Nashville, Cumberland Gap, and Memphis.
Kentucky,	Louisville, and Maysville.
Ohio,	Cincinnati, Columbus, and Toledo.
Michigan,	Detroit.
Indiana,	Vincennes, and Indianapolis.
Illinois,	Shawneetown, and Chicago.
Missouri,	St. Louis.
Arkansas,	Jackson.

POSTMASTERS

Who receive emoluments of $500 *and upwards, with the amount of their compensation.*

MAINE.

	Compensation.
Augusta, A. R. Nichols,	$1,365.80
Bangor, Chas. K. Miller,	1,192.15
Bath, Thomas Eaton,	842.91
Belfast, Henry Coleburn	550.83
Brunswick, T. S. McLellan,	679.41
Calais, William Goodwin	759.90
Gardner, Thomas Gay,	562.91
Hallowell, Ichabod Nutter,	765.32
Houlton, Leonard Pierce,	589.60
Portland, S. R. Lyman,	2,000.00
Robbinston, Josiah H. Vose,	781.44
Saco, Thos. W. Shannon,	699.04
Thomaston, John M. Gates,	509.51

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NEW HAMPSHIRE.

Compensation.

Concord, Robert Davis, . .1,066.53
Dover, Asa A. Tufts, ... 825.05
Exeter, Jeremiah Dearborn, 504.03
Hanover, Jona. Freeman, . . 688.30
Keene, Charles L. Putnam, . 625.41
Nashua, David Philbrick, . . 775.65
Portsmouth, Sam. Gookin, 1,609.43

VERMONT.

Brattleboro', F. H. Fessenden, 629.11
Burlington, William Noble, 731.62
Middlebury, Chas. Bowen, . 624.76
Montepelier, Ed. S. Merrill, 659.45
Woodstock, C. G. Eastman, . 524.79

MASSACHUSETTS.

Andover, Saml. Phillips, . . . 767.04
Boston, Nathl. Green, ... 2,000.00
Cabotville, Amos W. Stockwell, ... 522.78
Cambridge, Thos. J. Whittemore, ... 581.68
Charlestown, Wm. Sawyer, 786.01
Fall River, C. B. Vickery, . 900.78
Greenfield, Richard Hall, . . 578.85
Haverhill, Chas. B. Hall, . . 709.01
Lee, Hubbard Bartlett, ... 522.54
Lowell, Jacob Robbins, . . . 1,226.79
Lynn, Benj. Mudge, ... 801.28
Nantucket, S. H. Jenks, . . 1,154.62
New Bedford, S. Bailey, . . 1,571.93
Newburyport, B. W. Hale, 1,251.19
Northampton, Amos H. Bullen, ... 1,087.11
Pittsfield, Jonathan Allen, . 585.40
Plymouth, Ephraim Spooner, 544.91
Salem, Caleb Foote, ... 1,762.95
Springfield, Usalen Ames, 1,499.11
Taunton, C. R. Vickers, . . . 897.07
Westfield, Joseph Root, ... 580.40
Worcester, M. L. Fisher, . 1,591.29

RHODE ISLAND.

Bristol, Wm. B. Tilley, ... 508.71
Newport, Asher Robbins, . 1,357.34
Pawtucket, David Benedict, 669.83
Providence, E. J. Mallett, 1,980.77

CONNECTICUT.

Bridgeport, I. Sherman, Jr. 928.73
Hartford, Joseph Pratt, . . . 2,000.00

Compensation.

Litchfield, Geo. C. Woodruff, 516.02
Middletown, Eli Wilcox, . 1,173.31
New Haven, H. Huggins, . 1,568.42
New London, J. H. Turner, 1,146.42
Norwich, John H. Townsend, ... 1,222.67

NEW YORK.

Albany, James D. Wasson, 1,972.12
Albion, Henry J. Sickles, . . 737.56
Auburn, W. C. Beardsley, 1,662.28
Batavia, Frederick Follett, 1,067.10
Bath, Levi C. Whiting, ... 698.48
Binghampton, Tracy Robinson, ... 850.54
Brooklyn, George Hall, . . 1,519.72
Buffalo, C. C. Haddock, . . 2,000.00
Canandaigua, Jonas M. Wheeler, ... 1,234.76
Cattskill, Wm. W. Van Loan, 918.05
Cazenovia, Benj. T. Clark, . 630.33
Cooperstown, Robert Davis, 785.45
Danville, Samuel Shannon, 535.18
Elmira, Levi J. Cooley, . . . 821.90
Fredonia, Eben A. Leister, . 586.22
Geneseo, Daniel H. Bissel, . 526.46
Geneva, James Rees, ... 1.734.72
Hamilton, Asa F. Chapin, . . 699.04
Hudson, Justus McKinstry, 1,317.43
Ithaca, Jacob M. McCormick, ... 1,283.39
Jamestown, Joseph Kenyon, 551.46
Keesville, Gorton T. Thomas, 535.53
Kingston, William Cully, . . 775.54
Lansinburgh, Sidney D. Smith, ... 586.70
Le Roy, John H. Stanley, . . 732.96
**Lewiston*, Leonard Bennett, 932.71
Little Falls, M. Bettenger, . 706.34
Lockport, H. W. Scovell, . 1,595.28
Lyons, Ezekiel Price, ... 764.38
Newark, Rich. P. Williams, 504.01
Newburgh, James Belknap, 1,175.72
New York, J. L. Graham, 2,000.00
Norwich, Squire Smith, ... 558.72
Ogdensburgh, P. B. Fairchild, ... 942.17
Oswego, James Cochran, . 1,498.51

* Being a distributing office, the whole receipts are taken to pay the Postmaster.

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Compensation.

Owego, Daniel Ely, ...1,159.09
Oxford, Cyrus A. Bacon, ..513.16
Palmyra, David H. Hoyt, ..798.11
Penn Yan, Darius A. Ogden, ...679.15
Plattsburgh, Levi Platt, ...732.37
Poughkeepsie, J. Van Benthuysen, ...1,789.88
Rochester, S. G. Andrews, 1,586.01
Rome, Jay Hathaway, ...841.45
Saratoga Springs, Thomas J. Marvin, ...835.06
Schenectady, James M. Bouck, ...1,357.77
Seneca Falls, Isaac Fuller, .745,19
Skaneateles, Joel Thayer, ..775.22
Syracuse, Henry Rayner, .1,898.74
Troy, Geo. R. Davis, ...1,652.65
Utica, Augustine G. Dauby, 1,494.80
Waterloo, Franklin Gage, ..690.16
Watertown, J. F. Hutchinson, ...905.63
Watervleit, Ed. Learned, ..782.54
West Point, Claudius Berard, ...811.79
White Hall, H.W. Kirtland, 801,99

NEW JERSEY.

Burlington, Budd Sterling, .548.16
Elizabethtown, Thomas B. C. Dayton, ...558.10
Newark, John J. Plume, ..1,789.29
New Brunswick, John Simpson, ...874.29
Paterson, William D. Quin, 750.64
Princeton, Abraham J. Berry, ...1.029.32
Trenton, Joseph Justice, .1,204.33

PENNSYLVANIA.

Alleghany, Wm. Kearnes, .631.83
Bedford, James Reamer, ...543.36
Bellefonte, Wm. Graffius, .521.31
Brownsville, William Sloan, 571.38
Carlisle, William M. Porter, ...1,255.73
Chambersburgh, David D. Durborow, ...1,003.16
Columbia, G. G. Claibourne, 558.61
Easton, Abraham Coryell, ...1,462.26

Compensation.

**Erie*, Andrew Scott, ...1,809.05
Gettysburg, Hezekiah Van Orsdell, ...617.75
Harrisburg, J. Peacock, .1,794.50
Hollidaysburg, J. Coffey, ..826.89
Kensington, (Phila.) James W. Hall, ...500:49
Lancaster, Mary Dickson, 1,473.97
Lewistown, Wm. P. Elliot, 701.94
Meadville, James C. Hays, .545.19
Northumberland, Daniel Weimer, ...563.05
Philadelphia, Jas. Hoy, Jr. 2,000.00
Pittsburgh, R. M. Riddle, 1,881.71
Pottsville, J. F. Werner, ..1,054.38
Reading, Charles Troxell, 1,269.07
Uniontown, Daniel Smith, ..644.37
Washington, R. Colmery, ..650.59
West Chester, John McGinley, ...563.81
Wilkesbarre, Jos. P. Le Clerc, ...855.99
Williamsport, Jos. S. Titus, 635.80
York, George Upp, Jr., ...749.13

DELAWARE.

Wilmington, Wm. R. Sellers, ...1,682.52

MARYLAND.

Baltimore, Thos. Finley, .2,000.00
Cumberland, D. Wineow, ..811.26
Frederick, John Rigney, ..1,147.07
Hagerstown, F. Humriehouse, ...981.02

DISTRICT OF COLUMBIA.

Alexandria, Danl. Bryan, 1,987.96
Georgetown, H. W. Tilley, ...1,768.63
Washington City, William Jones, ...2,000.00

VIRGINIA.

†*Abingdon*, J. K. Gibson, .1,542.91
Charlestown, Humph. Keys, 593.56
Charlottesville, T. Wayt, ..875.75
Danville, Thomp. Coleman, 589.76

* This is a distributing office, and the amount of compensation is more than the receipts of the office.

† Being a distributing office, the commissions exceed the receipts.

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Compensation

Farmville, James McNutt, .617.02
Fredericksburg, Reuben T. Thom,.....1,385.24
Halifax, C. H., J. S. Easby, 505.87
Kanawha, C. H., James A. Lewis,.....711.21
Lexington, Arch. Graham, .633.78
Lynchburg, L. H. Trigg,.1,869.85
Norfolk, Alexander Galt, .2,025.04
Petersburg, John Minge, .2,000.00
Portsmouth, John Hodges, .817.16
Richmond, Bernard Peyton,.....1,980.14
Staunton, N. C. Brooks, ...702.71
Wheeling, David Agnew, 2,0 0,00
Winchester, John Wall, ..1,291.91

NORTH CAROLINA.

**Ashville*, M. Patton,.....850.17
Edenton, Theo. J. Bland, ..530.15
Fayetteville, John McRae, 1,652,58
Greensboro', J. J. M. Lindsay,.... .....1,094.19
Hillsboro', Thos Clancey, ..516.32
Newbern, W. G. Bryan,....923.41
Raleigh, Thos. G. Scott, .1,644,26
Washington, W. O. Cain, .578.81
Wilmington, William C. Bettencourt,.....1,634.52

SOUTH CAROLINA.

Beaufort, B. R. Bythewood, 568.47
Camden, John N. Gamewell, 783.42
†*Charleston*, Alfred Huger, 1,922,74
Cheraw, Brown Bryan, ...848.23
Columbia, A. H. Gladden, 1.333.84
Georgetown, W. McNulty, 853.32
Greenville C. H., R. Thruston,.....541.52
Hamburg, C. H. Lindsey,..565.58
Yorkville, Samuel Melton, .780.96

GEORGIA.

Athens, W. L. Mitchell, ...896.62
Augusta, E. B. Glascock, .2,000.00
Columbus, G. W. E. Bedell,.....1,686.72
Darien, Jas. F. S. Heald, ..748.37

* Distributing office; the Postmaster's commissions are more than the receipts.
† Distribution office.

Compensation.

Macon, Keeland Tyner, ..1,706.66
Milledgeville, E. Daggett, 1,727.89
Savannah, George Schley, 1,806.14
Sparta, J. H. Burnett,.....579.16
Washington, J. W. Robinson, ...692.68

FLORIDA TERRITORY.

Apalachicola, G. F. Baltzell, 962.32
Pensacola, Hanson Kelly, ..797.45
St. Augustine, Peter C. Zylstra,.....645.91
Tallahasse, Miles Nash, ..1,477.58
Garey's Ferry, Amaziah Coy,.....606.06

ALABAMA.

Florence, Joshua D. Coffee,.854.74
Gainesville, R. G. McMahon,.....521.49
Greensboro', John Street, ..945.72
Huntsville, George Cox,..1,011.54
Eufaula, Jacob Smith,.....607,30
Mobile, John W. Townsend, 930.68
Montgomery, Neil Blue,..1,829.29
Perry, C. H., Henry F. Godden,.....762.04
Selma, John M. Strong, ...572.94
Tuscaloosa, W. D. Marrast, 1,597.10
Tuscumbia, Jonas J. Bell..539.13
Wetumpka, Leander Bryan, 683.31

MISSISSIPPI.

Canton, James Priestly,....593.62
Clinton's, Seneca Pratt, ...525.22
Columbus, David P. Blair, 1,210.69
Grenada, James Sims, ...521.22
Holly Springs, William E. Williams,.....670.60
Jackson, Howell Hobbs,..1,191.32
Natchez, Woodson Wren, 1,423.21
Port Gibson, R. Parkinson. 640.93
Vicksburg, N. D. Coleman, 801.38
Woodville, John B. Therrell, 638,21

LOUISIANA.

Baton Rouge, Hugh T. Waddill,.....672.84
Donaldsonville, A. Gingray, 526.30

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Compensation.

New Orleans, (Distrib. office,) Alex. G. Penn, ...903.81
St. Francisville, D. Austin, 634.21

ARKANSAS.

Little Rock, B. Williams, ..948.00

TENNESSEE.

Clarksville, John D. Bradley, 744.46
Columbia, H. Langtry, ...871.06
Franklin, Jas. P. Maury, ..537.30
Gallatin, Thomas G. Moss, 551.12
Knoxville, J. W. Campbell, 810.44
Memphis, M. B. Winchester, ...1,426.05
Murfreesborough, G. T. Henderson, ...600.96
Nashville, R. Armstrong, .1.968.73
Sommerville, William D. Wilkerson, ...675.64

KENTUCKY.

Bardstown, W. M. Powell, .563.80
Bowling Green, Charles D. Morehead, ...636.03
Danville, Amanda F. Greenwood, ...607.14
Frankfort, Wm. Hardin, .1,345.78
Georgetown, W. McDaniel, 638.03
Harrodsburg, G. T. Whitney, ...555.55
Hopkinsville, H. Ashford, ..665.93
Lexington, Joseph Ficklin, 1,815.54
Louisville, L. H. Mosby, .2,000.00
Maysville, J. W. Coburn, .1,181.19
Richmond, J. M. Shakelford, 576.42
Shelbyville, John Lane, ...626.39
Versailles, Robert Kinkead, 580.09

OHIO.

Chillicothe, John Roy Anderson, ...1,378.41
Cincinnati, W. H. Harrison Taylor, ...1,747.91
Circleville, Wm. B. Brown, 717.99
Cleveland, Benj. Andrews, 1,638.97
Columbus, John G. Miller, 1,976.25
Dayton, James Brooks, ...1,356.70
Granville, A. P. Weightman, 554.74
Lancaster, James Cranmer, 580.67
Lebanon, Thomas F. Brodie, 520.55

Compensation.

Mansfield, Jacob Hammer, .533.39
Masillon, G. W. Williams, .637.75
Mount Vernon, William H. Whitton, ...644.87
Newark, Levi S. Houghey, .828.28
Norwalk, Obadiah Jenney, .538.42
Portsmouth, W. Kendall, ..685.41
Springfield, John A. Crain, 803.97
Steubenville, W. Collins, .1,005.23
Toledo, Andrew Palmer, .1,415.44
Urbana, Newton Ambrose, .555.88
Warren, J. McLain, ...538.99
Wooster, B. L. Crawford, ..698.83
Xenia, John H. Purdy, ...535.54
Zanesville, Israel Hoge, ..1,776.20

MICHIGAN.

Adrian, Abel Whitney, ...537.80
Ann Arbor, Geo. Danforth, .751.50
Detroit, Thos. Rowland, ..1,877.69
Marshall, J. M. Parsons, ...676.15
Monroe, Joseph C. Cole, ...604.98
Niles, Joseph C. Larimore, .541.33

INDIANA.

Crawfordsville, William P. Watson, ...501.96
Evansville, Daniel Chute, ..711.60
Fort Wayne, S. Noel, ...604.11
Indianapolis, Samuel Henderson, ...1,677.43
Lafayette, Rudolph S. Ford, 704.42
Madison, Andrew Collins, 1,203.89
New Albany, Alex. S. Burnett, ...740.35
Richmond, Daniel D. Sloan, 542.92
Terre Haute, Joseph O. Jones, ...951.00
Vincennes, (Distrib. office,) James W. Greenhow, ..1,324.52

ILLINOIS.

Alton, Benj. F. Edwards, ..945.54
Belleville, James Mitchell, .548.76
Chicago, William Stuart, .1,990.58
Galena, Robert W. Carson, .969.64
Jacksonville, E. A. Means, .795.94
Ottowa, Alson Woodruff, ...514.24
Peoria, Wm. H. Fessenden, 664.81
Quincy, Benj. Clifford, Jr. ..695.99

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Compensation.

Shawneetown, J. Stickney, 1,500.62
Springfield, George W. Spotswood, ...053.77

MISSOURI.

Boonville, James M. Major. 520.48
St. Louis, S. B. Churchill, 2,000.00

Compensation.

IOWA TERRITORY.

Burlington, G. Temple, ...690.78

WISCONSIN TERRITORY.

Milwaukee, Josiah A. Noonan, ...634.49

RATES OF POSTAGE.

On a single Letter.

For any distance, not exceeding	30 miles,	6 cents.
Over 30, and not exceeding	80 "	10 "
Over 80, and not exceeding	150 "	12½ "
Over 150, and not exceeding,	400 "	18¾ "
Over 400 miles,		25

The postage on *Ship Letters*, if delivered at the office where the vessel arrives, is six cents; if conveyed by post, two cents in addition to the ordinary postage.

A *Letter* composed of two pieces of paper, is charged with *double* these rates; of three pieces, with *triple*; and of four pieces, with *quadruple*. One or more pieces of paper, mailed as a letter, and weighing *one ounce*, is charged with *quadruple* postage; and at the same rate, if the weight be greater. Letter postage is charged on all hand-bills, printed or written; prices current, sealed or unsealed, prospectuses, proposals for new publications, circulars, lottery bills, and advertisements, blank forms, sheets of music, deeds, law processes, policies of insurance, and manuscript copy for publication. Letter postage is also charged on all packets that are closely enveloped and sealed.

Newspaper Postage.

For each *newspaper*, not carried out of the state in which it is published, or, if carried out of the state, not carried over 100 miles, 1 cent. Over 100 miles, and out of the state in which it is published 1½ cents.

Magazines and Pamphlets.

If published periodically,	distance not exceeding	100 miles,	1½	cents per sheet.
do. do.	distance over	100 "	2¼	" "
If not published periodically,	dist. not exceeding	100 "	4	" "
do. do.	distance over	100 "	6	" "

Every *Printed Pamphlet* or *Magazine* which contains more than twenty-four pages, on a *royal* sheet, or any sheet of *less* dimensions, shall be charged by the sheet; and small pamphlets, printed on a half or quarter sheet, of royal or less size, shall be charged with half the amount of postage charged on a full sheet. A pamphlet is a small unbound printed book. A magazine is a pamphlet published periodically in numbers, containing articles on science, literature, politics, news, &c. Pamphlet postage is charged on magazines, almanacs, college catalogues, and annual reports or minutes of societies.

PRIVILEGE OF FRANKING.

Letters and packets to and from the following officers of the government, are by law received and conveyed by post, free of postage:

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The President and Vice-President of the United States; Secretaries of State, Treasury, War, and Navy; Attorney-General; Postmaster General, and Assistant Post-master-General; Comptrollers, Auditors, Register, and Solicitor of the Treasury; Treasurer; Commissioner of the General Land Office; Commissioners of the Navy Board; Commissary-General; Inspectors-General; Quartermaster-General; Paymaster-General; Superintendent of the Patent-Office; Speaker and Clerk of the House of Representatives; President and Secretary of the Senate; and any individual who shall have been, or may hereafter be, President of the United States; and each may receive newspapers by post, free of postage.

Each member of the Senate, and each member and delegate of the House of Representatives, may send and receive, free of postage, newspapers, letters, and packets, weighing not more than two ounces, (in case of excess of weight, the excess alone to be paid for,) and all documents printed by order of either House, from the period of sixty days before he takes his seat in Congress, till the next meeting of the next Congress.

Postmasters may send and receive, free of postage, letters and packets, not exceeding half an ounce in weight; and they may receive one daily newspaper each, or what is equivalent thereto.

Printers of newspapers may send one paper to each and every other printer of newspapers within the United States, free of postage, under such regulations as the Post-master-General may provide.

STATISTICS OF THE DEPARTMENT.

(*From the Annual Report of the Post-Master General, Dec.* 2, 1843.)

Number of Post-offices in the United States, (June 30, 1843,)..... 13,814
Length of Post-routes.....142,295 *Miles.*

Annual transportation of the mails during the year ending June 30, 1843.

	Miles.
By horse.....	11,146,229
By coaches.....	18,414,174
By rail-roads and steamboats	5,692,402
	35,252,805

Expenditures of the mail service for the year ending June 3, 1843..... $4,374,713.75
Revenue for the same period..... 4,295,925.43

Excess of expenditure over revenue..... $78,788.32

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II. LEGISLATIVE.

MEMBERS OF THE TWENTY-EIGHTH CONGRESS.

{ *First Session commenced Dec.* 4, 1843—*ended June* 17, 1844.
{ *Second Session commences Dec.* 2, 1844—*ends March* 3, 1845.

SENATE.

(With the dates of the expiration of the respective terms of the various Senators; which terminate on the 3d day of March, in the years specified.)

WILLIE P. MANGUM, of North Carolina, President of the Senate *pro tempore.*

MAINE.

John Fairfield,.....1845
George Evans,.....1847

NEW HAMPSHIRE.

Levi Woodbury, ...1847
Charles G. Atherton,.....1849

MASSACHUSETTS.

Rufus Choate, ...1845
Isaac C. Bates,.....1847

RHODE ISLAND.

John B. Francis, ...1845
James F. Simmons, ...1847

CONNECTICUT.

Jabez W. Huntington, ...1845
John M. Niles,.....1849

VERMONT.

Samuel S. Phelps,.....1845
William C. Upham,.....1849

NEW YORK.

———— ————.....1845
Silas Wright, Jr.....1849

NEW JERSEY.

William L. Dayton, ...1845
Jacob W. Miller,.....1847

PENNSYLVANIA.

Daniel Sturgeon,.....1845
James Buchanan,.....1849

DELAWARE.

Richard H. Bayard,.....1845
Thomas Clayton,.....1847

MARYLAND.

William D. Merrick,.....1845
James A. Pearce,.....1849

VIRGINIA.

William C. Rives,.....1845
William S. Archer,.....1847

NORTH CAROLINA.

Willie P. Mangum,.....1847
William H. Haywood, Jr.....1849

SOUTH CAROLINA.

Daniel E. Huger, ...1847
George McDuffie, ...1849

GEORGIA.

John McP. Berrien,.....184[illegible]
Walter T. Colquitt, ...184[illegible]

ALABAMA.

Dixon H. Lewis, ...1847
Arthur P. Bagby,.....849

MISSISSIPPI.

John Henderson, ...1845
Robert J. Walker,.....1847

LOUISIANA.

Alexander Barrow, ...1847
Henry Johnson, ...1849

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ARKANSAS.		INDIANA.	
William S. Fulton,	1847	Albert S. White,	1845
Ambrose H. Sevier,	1849	Edward A. Hannegan,	1849
TENNESSEE.		**ILLINOIS.**	
Ephraim H. Foster,	1845	James Semple,	1847
Spencer Jarnagin,	1847	Sidney Breese,	1849
KENTUCKY.		**MISSOURI.**	
James T. Morehead,	1847	Thomas H. Benton,	1845
John J. Crittenden,	1849	David R. Atchison,	1849
OHIO.		**MICHIGAN.**	
Benjamin Tappan,	1845	Augustus S. Porter,	1845
William Allen,	1849	William Woodbridge,	1847

Asbury Dickens, Secretary, ... salary, $3,000

HOUSE OF REPRESENTATIVES.

(With the Districts which the Members respectively represent.)

JOHN W. JONES, of Virginia, Speaker.

MAINE, (7.)

Districts.	Names of Members.	Counties.
1.	Benjamin J. Herrick,	York, and part of Oxford.
2.	Robert P. Dunlap,	Cumberland.
3.	Luther Severance,	Lincoln, part of Kennebec, and residue of Oxford.
4.	Freeman H. Morse,	Franklin, and residue of Kennebec.
5.		Somerset and Waldo, (except town of Vinalhaven.)
6.	Hannibal Hamlin,	Penobscot, Piscataquis.
7.	Shepherd Cary,	Aroostook, Hancock, Washington, and town of Vinalhaven.

NEW HAMPSHIRE, (4.)

(*Elected by General Ticket.*)

Edmund Burke,	Moses Norris, Jr.
John P. Hale,	John R. Reding,

VERMONT, (4.)

1.	Solomon Foote,	Bennington, Rutland, Windham.
2.	Jacob Collamer,	Orange, Windsor.
3.	George P. Marsh,	Addison, Chittenden, Franklin, Grand Isle.
4.	Paul Dillingham, Jr.	Caledonia, Essex, Lamoelle, Orleans, Washington.

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MASSACHUSETTS, (10.)

Districts.	Names of Members.	Counties.
1.	Robert C. Winthrop,	City of Boston.
2.	Daniel P. King,	Parts of Essex and Middlesex counties, and town of Chelsea in Suffolk county.
3.	Amos Abbott,	Parts of Essex and Middlesex.
4.	William Parmenter,	Parts of Middlesex and Worcester.
5.	Charles Hudson,	Parts of Worcester.
6.	Osmyn Baker	Parts of Franklin, Hampden, Hampshire, and Worcester.
7.	Julius W. Rockwell,	Berkshire, and the residue of Franklin, Hampden, and Hampshire.
8.	John Quincy Adams,	Norfolk, and parts of Plymouth and Middlesex.
9.	Henry Williams,	Parts of Plymouth and Bristol.
10.	Joseph Grinnell,	Barnstable, Dukes, Nantucket, and residue of Plymouth and Bristol.

RHODE ISLAND, (2.)

		Towns.
1.	Henry Y. Cranston,	City of Providence, and towns of Barrington, Bristol, Cumberland, Little Compton, Middletown. Newport, North Providence, Portsmouth, Smithfield, Tiverton, Warren.
2.	Elisha R. Potter,	Residue of the State.

CONNECTICUT, (4.)

		Counties.
1.	Thomas H. Seymour,	Hartford and Tolland.
2.	John Stewart,	New Haven, Middlesex.
3.	George H. Catlin,	New London, Windham.
4.	Samuel Simons,	Fairfield, Litchfield.

NEW YORK, (34.)

		Counties and Wards.
1.	Selah B. Strong,	Suffolk, Queens.
2.	Henry C. Murphy,	Kings, Richmond.
3.	J. Phillips Phœnix,	New York, 1st, 2d, 3d, 4th and 5th wards.
4.	William B. Maclay,	6th, 7th. 10th, 13th wards.
5.	Moses G. Leonard,	8th, 9th, 14th wards.
6.	Hamilton Fish,	11th, 12th, 15th, 16th and 17th wards.
7.	Joseph H. Anderson,	Westchester, Rockland.
8.	Richard D. Davis,	Dutchess, Putnam.
9.	James G. Clinton,	Orange, Sullivan.
10.	Jeremiah Russell,	Ulster, Delaware.
11.	Zadock Pratt,	Columbia, Greene.
12.	David L. Seymour,	Rensselaer.
13.	Daniel D. Barnard,	Albany.
14.	Charles Rogers,	Washington, Essex.

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Districts.	Names of Members.	Counties.
15.	Lemuel Stetson,.....	Clinton, Franklin, Warren, and N. half of Hamilton.
16.	Chesselden Ellis, ...	Saratoga, Schenectady, Fulton, and balance of Hamilton,
17.	Charles S. Benton,...	Herkimer, Montgomery.
18.	Preston King,.....	St. Lawrence, Lewis.
19.	Orville Hungerford,..	Jefferson.
20.		Oneida.
21.	Jeremiah E. Cary, ...	Otsego, Schoharie.
22.	Smith M. Purdy, ...	Chenango, Broome, Tioga.
23.	Orville Robinson,....	Madison, Oswego.
24.	Horace Wheaton,....	Onondaga.
25.	George Rathbun, ...	Cayuga, Cortland.
26.	Amasa Dana,.....	Tompkins, Chemung, Yates.
27.	Byram Green,.....	Seneca, Wayne.
28.	Thomas J. Patterson,.	Monroe.
29.	Charles H. Carroll,...	Ontario, Livingston.
30.	William S. Hubbell,..	Steuben, Allegheny.
31.	Asher Tyler,.....	Cattaraugus, Chautauque.
32.	William A. Mosely,..	Erie.
33.	Albert Smith,.....	Genesee, Wyoming.
34.	Washington Hunt,...	Orleans, Niagara.

NEW JERSEY, (5.)

1.	Lucius Q. C. Elmer,..	Atlantic, Camden, Cape May, Cumberland, Gloucester, Salem.
2.	George Sykes, ...	Burlington, Monmouth.
3.	Isaac G. Farlee,.....	Hunterdon, Mercer, Middlesex, Somerset.
4.	Littleton Kirkpatrick,	Morris, Sussex, Warren.
5.	William Wright,....	Bergen, Essex, Hudson, Passaic.

PENNSYLVANIA, (24.)

1.	Edward J. Morris, ...	Southwark, Moyamensing and Passyunk, in the County of Philadelphia, and Cedar and New Market wards, in the City of Philadelphia.
2.	Joseph R. Ingersoll,..	Residue of the City of Philadelphia.
3.	John T. Smith,.....	The Northern Liberties and Spring Garden, in the County of Philadelphia.
4.	Charles J. Ingersoll,..	Residue of the County of Philadelphia.
5.	Jacob S. Yost,.....	Delaware, Montgomery.
6.	Michael H. Jenks, ...	Bucks, Lehigh.
7.	Abrah. R. M'ilvaine,.	Chester.
8.	Jeremiah Brown, ...	Lancaster.
9.	John Ritter, ...	Berks.
10.	Rich. Brodhead, Jr. ..	Carbon, Monroe, Northampton, Pike, Wayne.

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Districts.	Names of Members.	Counties.
11.	Benjamin A. Bidlack,	Columbia, Luzerne, Wyoming.
12.		Bradford, Susquehanna, Tioga.
13.	James Pollock,	Clinton, Lycoming, Northumberland, Union.
14.	Alexander Ramsay,	Dauphin, Lebanon, Schuylkill.
15.	Henry Nes,	Adams, York.
16.	James Black,	Cumberland, Franklin, Perry.
17.	James Irvin,	Centre, Huntingdon, Juniata, Mifflin.
18.	Andrew Stewart,	Fayette, Greene, Somerset.
19.	Henry D. Foster,	Bedford, Cambria, Westmoreland.
20.	John Dickey,	Beaver, Washington.
21.	Cornelius Darragh,	Allegheny.
22.	Samuel Hays,	Crawford, Mercer, Venango.
23.	Charles M. Reed,	Clarion, Elk, Erie, Jefferson, M'Kean, Potter, Warren.
24.	Joseph Buffington,	Armstrong, Butler, Clearfield, Indiana.

DELAWARE, (1.)

George B. Rodney.

MARYLAND, (6.)

1.	John M. S. Causin,	Annapolis City, Anne Arundel County, (except Howard District), Calvert, Charles, Montgomery, Prince George, and St. Mary's.
2.	Francis Brengle,	Allegheny, Frederick, Washington.
3.	John Wethered,	Howard District, in Anne Arundel County, Baltimore City (12th, 13th, and 14th wards), and Baltimore and Carroll Counties.
4.	John P. Kennedy,	Baltimore City (first 11 wards.)
5.	Jacob A. Preston,	Caroline, Cecil, Harford, Kent, Queen Anne's.
6.	Thomas A. Spence,	Dorchester, Somerset, Talbot, Worcester.

VIRGINIA, (15.)

1.	Archibald Atkinson,	Isle of Wight, Nansemond, Norfolk, Norfolk borough, Princess Anne, Southampton, Surry, Sussex.
2.	Geo. C. Dromgoole,	Amelia, Brunswick, Dinwiddie, Greensville, Mecklenburg, Nottoway, Petersburg, Prince George.
3.	Walter Coles,	Franklin, Halifax, Henry, Patrick, Pittsylvania.
4.	Edmund W. Hubard,	Buckingham, Campbell, Charlotte, Cumberland, Fluvanna, Lunenburg, Prince Edward.

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Districts.	Names of Members.	Counties.
5.	William L. Goggin,	Albemarle, Amherst, Bedford, Greene, Madison, Nelson, Orange.
6.	John W. Jones, (*Sp.*)	Chesterfield, Goochland, Hanover, Henrico, Louisa, Powhatan, Richmond City.
7.	Thomas H. Bayly,	Accomac, Charles City, Elizabeth City, Gloucester, James City, Lancaster, Matthews, New Kent, Northampton, Northumberland, Warwick, Williamsburg, York.
8.	Willoughby Newton,	Caroline, Essex, King and Queen, King George, King William, Middlesex, Richmond, Spotsylvania, Westmoreland.
9.	Samuel Chilton,	Culpeper, Fairfax, Fauquier, Loudoun, Prince William, Rappahannock, Stafford.
10.	William Lucas,	Berkeley, Clarke, Frederick, Hampshire, Jefferson, Morgan, Page, Warren.
11.	William Taylor,	Augusta, Hardy, Pendleton, Rockbridge, Rockingham, Shenandoah.
12.	Augus. A. Chapman,	Allegheny, Bath, Botetourt, Floyd, Giles, Greenbrier, Logan, Mercer, Monroe, Montgomery, Pocahontas, Pulaski, Roanoke.
13.	George W. Hopkins,	Carroll, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wythe.
14.	George W. Summers,	Part of Barbour, Braxton, Cabell, Fayette, Harrison, Jackson, Kanawha, Lewis, Mason, Nicholas, Ritchie, Wayne, Wood.
15.	Lewis Steenrod,	Part of Barbour, Brooke, Marion, Marshall, Monongalia, Ohio, Preston, Randolph, Tyler.

NORTH CAROLINA, (9.)

1.	Thomas L. Clingman,	Buncombe, Burke, Caldwell, Cherokee, Cleveland, Haywood, Henderson, Macon, M'Dowell, Rutherford, Yancey.
2.	Daniel M. Barringer,	Cabarrus, Catawba, Davie, Iredell, Lincoln, Mecklenburg, Rowan.
3.	David S. Reid,	Ashe, Caswell, Rockingham, Stokes, Surry, Wilkes.
4.	Edmund Deberry,	Anson, Davidson, Guilford, Montgomery, Randolph, Richmond, Stanly.
5.	Romulus M. Saunders,	Chatham, Cumberland, Johnston, Moore, Wake, Wayne.
6.	James J. McKay,	Bladen, Brunswick, Columbus, Duplin, Jones, Lenoir, New Hanover, Onslow, Robeson, Sampson.

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Districts.	Names of Members.	Counties.
7.	John R. J. Daniel,	Franklin, Granville, Halifax, Orange, Person, Warren.
8.	Arch. H. Arrington,	Beaufort, Carteret, Craven, Edgecombe, Greene, Hyde, Nash, Pitt, Tyrrell, Washington.
9.	Kenneth Rayner,	Bertie, Camden, Chowan, Currituck, Gates, Hertford, Martin, Northampton, Pasquotank, Perquimans.

SOUTH CAROLINA, (7.)

1.	James A. Black,	Chester, Spartanburg, Union, York.
2.	Richard F. Simpson,	Anderson, Greenville, Laurens, Pickens.
3.	Joseph A. Woodward,	Fairfield, Kershaw, Lancaster, Richland, Sumpter.
4.	John Campbell,	Chesterfield, Darlington, Georgetown, Horry, Marion, Marlborough, Williamsburg.
5.	Armstead Burt,	Abbeville, Edgefield, Lexington, Newberry.
6.	Isaac E. Holmes,	Charleston (except the parish of St. John Colleton.)
7.	R. Barnwell Rhett,	Barnwell, Beaufort, Colleton, Orangeburgh, and the parish of St. John Colleton.

GEORGIA, (8.)

(*Elected by general Ticket.*)

Edward J. Black,	Hugh A. Haralson,
Absalom H. Chappell,	John H. Lumpkin,
Duncan L. Clinch,	Alexander H. Stephens,
Howell Cobb,	William H. Stiles.

ALABAMA, (7.)

1.	James Dellett,	Baldwin, Butler, Clarke, Conecuh, Marengo, Mobile, Monroe, Washington, Wilcox.
2.	James E. Belser,	Barbour, Coffee, Covington, Dale, Henry, Macon, Montgomery, Pike, Russell.
3.	——— ———	Autauga, Bibb, Coosa, Dallas, Jefferson, Lowndes, Perry, Shelby.
4.	William W. Payne,	Fayette, Greene, Pickens, Sumpter, Tuscaloosa.
5.	George S. Houston,	Franklin, Lauderdale, Lawrence, Limestone, Marion, Morgan, Walker.
6.	Reuben Chapman,	Blount, De Kalb, Jackson, Madison, Marshall, St. Clair.
7.	Felix G. M'Connell,	Benton, Chambers, Cherokee, Randolph, Talladega, Tallapoosa.

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MISSISSIPPI, (4.)

(*Elected by general Ticket.*)

William H. Hammett, Jacob Thompson,
Robert W. Roberts, Tilghman M. Tucker.

LOUISIANA, (4.)

Districts.	Names of members.	Parishes.
1.	John Slidell,	City of New Orleans, (first and third Municipalities, and the suburb Trémés,) Plaquemines, St. Bernard.
2.	Alcée Labranche,	New Orleans, (second municipality, and the suburb Algiers,) Ascension, Assumption, Jefferson, Lafourche, Interior, St. Charles, St. James, St. John Baptist, Terrebonne.
3.	John B. Dawson,	Avoyelles, East and West Baton Rouge, Carroll, Catahoula, Concordia, East and West Feliciana, Franklin (part,) Iberville, Livingston, Madison, Pointe Coupée, St. Helena, St. Tammany, Tensas, Washington.
4.	Isaac E. Morse,	Bossier, Caddo, Calcasiu, Caldwell, Claiborne, De Soto, Franklin (part,) Lafayette, Morehouse, Natchitoches, Ouachita, Rapides, Sabine, St. Landry, St. Martin, St. Mary, Union, Vermillion.

ARKANSAS, (1.)

Edward Cross.

TENNESSEE, (11.)

		Counties.
1.	Andrew Johnson,	Carter, Cocke, Greene, Hawkins, Johnson, Sullivan, Washington.
2.	William T. Senter,	Anderson, Blount, Campbell, Claiborne, Grainger, Jefferson, Monroe, Morgan, Sevier.
3.	Julius W. Blackwell,	Bledsoe, Bradley, Hamilton, Knox, Marion, McMinn, Meigs, Polk, Rhea, Roane.
4.	Alvan Cullom,	Coffee, De Kalb, Fentress, Jackson, Overton, Van Buren, Warren, White.
5.	George W. Jones,	Bedford, Franklin, Lincoln, Marshall.
6.	Aaron V. Brown	Giles, Hardin, Hickman, Lawrence, Maury, Wayne.
7.	David W. Dickinson,	Cannon, Rutherford, Williamson, Wilson.
8.	Joseph H. Peyton,	Davidson, Smith, Sumner.
9.	Cave Johnson,	Benton, Dickson, Henry, Humphreys, Montgomery, Robertson, Stewart.

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Districts.	Names of Members.	Counties.
10.	John B. Ashe,	Dyer, Fayette, Hardeman, Haywood, Lauderdale, McNairy, Shelby, Tipton.
11.	Milton Brown,	Carroll, Gibson, Henderson, Madison, Obion, Perry, Weakley.

KENTUCKY, (10.)

1.	Lynn Boyd,	Ballard, Caldwell, Calloway, Crittenden, Graves, Hickman, Hopkins, Livingston, Marshall, McCracken, Trigg, Union.
2.	Willis Green,	Breckenridge, Butler, Christian, Daviess, Edmonson, Grayson, Hancock, Henderson, Meade, Muhlenburg, Ohio.
3.	Henry Grider,	Allen, Barrett, Hart, Logan, Monroe, Simpson, Todd, Warren.
4.	George A. Caldwell,	Adair, Boyle, Casey, Clinton, Cumberland, Green, Lincoln, Pulaski, Russell, Wayne.
5.	James Stone,	Anderson, Bullitt, Hardin, Larue, Marion, Mercer, Nelson, Spencer, Washington.
6.	John White,	Clay, Estill, Floyd, Garrard, Harlan, Johnson, Knox, Laurel, Letcher, Madison, Perry, Pike, Rockcastle, Whitley.
7.	Wm. P. Thomasson,	Carroll, Henry, Jefferson, Louisville City, Oldham, Shelby, Trimble.
8.	Garrett Davis,	Bourbon, Fayette, Franklin, Jessamine, Owen, Scott, Woodford.
9.	Richard French,	Bath, Breatchitt, Carter, Clarke, Fleming, Greenup, Lawrence, Lewis, Montgomery, Morgan.
10.	John W. Tibbatts,	Boone, Bracken, Campbell, Gallatin, Grant, Harrison, Kenton, Mason, Nicholas, Pendleton.

OHIO, (21.)

1.	Alexander Duncan,	Hamilton.
2.	John B. Weller,	Butler, Darke, Preble.
3.	Robert C. Schenck,	Clinton, Greene, Montgomery, Warren.
4.	Joseph Vance,	Champaign, Clark, Logan, Madison, Miami, Union.
5.	Emery D. Potter,	Allen, Hardin, Henry, Lucas, Mercer, Paulding, Putnam, Shelby, Van Wert, Williams.
6.	Henry St. John,	Crawford, Hancock, Ottawa, Sandusky, Seneca, Wood.
7.	Joseph J. M'Dowell,	Brown, Clermont, Highland.
8.	John J. Vanmetre,	Adams, Hocking, Jackson, Pike, Ross.
9.	Elias Florence,	Fairfield, Fayette, Pickaway.
10.		Franklin, Knox, Licking.

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Districts.	Names of Members.	Counties.
11.	Jacob Brinkerhoff, ...	Delaware, Marion, Richland.
12.	Samuel F. Vinton, ...	Athens, Gallia, Lawrence, Meigs, Scioto.
13.	Perley B. Johnson, ...	Morgan, Perry, Washington.
14.	Alexander Harper, ...	Guernsey, Muskingum.
15.	Joseph Morris, ...	Belmont, Harrison, Monroe.
16.	James Matthews, ...	Coshocton, Holmes, Tuscarawas.
17.	Wm. C. M'Causlin, ..	Carroll, Columbiana, Jefferson.
18.	Ezra Dean, ...	Stark, Wayne.
19.	Daniel R. Tilden, ...	Portage, Summit, Trumbull.
20.	Joshua R. Giddings, ..	Ashtabula, Cuyahoga, Geauga, Lake.
21.		Erie, Huron, Lorain, Medina.

INDIANA, (10.)

1.	Robert Dale Owen, ..	Crawford, Dubois, Gibson, Harrison, Orange, Perry, Pike, Posey, Spencer, Vanderburg, Warwick.
2.	Thomas J. Henley, ..	Clark, Floyd, Jackson, Jefferson, Jennings, Scott, Washington.
3.	Thomas Smith, ...	Dearborn, Decatur, Franklin, Ripley, Rush, Switzerland.
4.	Caleb B. Smith, ...	Fayette, Union, Henry, Wayne.
5.	William J. Brown, ...	Bartholomew, Brown, Hamilton, Hancock, Johnson, Madison, Marion, Shelby.
6.	John W. Davis, ...	Daviess, Greene, Knox, Lawrence, Martin, Monroe, Morgan, Owen, Sullivan.
7.	Joseph A. Wright, ...	Clay, Hendricks, Parke, Putnam, Vermillion, Vigo.
8.	John Pettit, ...	Boone, Carroll, Clinton, Fountain, Montgomery, Tippecanoe, Warren.
9.	Samuel C. Sample, ..	Benton, Cass, Elkhart, Fulton, Jasper, Kosciusko, Lake, Laporte, Marshall, Miami, Porter, Pulaski, St. Joseph, Wabash, White.
10.	Andrew Kennedy, ...	Adams, Allen, Blackford, De Kalb, Delaware, Grant, Huntington, Jay, Lagrange, Noble, Randolph, Steuben, Wells, Whitley.

ILLINOIS, (7.)

1.	Robert Smith, ...	Alexander, Bond, Clinton, Jackson, Madison, Monroe, Perry, Pulaski, Randolph, St. Clair, Union, Washington.
2.	John A. M'Clernand, .	Edwards, Franklin, Gallatin, Hamilton, Hardin, Jefferson, Johnson, Marion, Massac, Pope, Wabash, Wayne, White, Williamson.
3.	Orlando B. Ficklin, ..	Christian, Clark, Clay, Coles, Crawford,

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Districts.	Names of Members.	Counties.
		Cumberland, De Witt, Edgar, Effingham, Fayette, Jasper, Lawrence, Macon, Moultrie, Montgomery, Piatt, Richland, Shelby.
4.	John Wentworth, ...	Boone, Bureau, Champaign, Cook, De Kalb, Du Page, Grundy, Iroquois, Kane, Kendall, Lake, La Salle, Livingston, M'Henry, M'Lean, Vermillion, Will.
5.	Stephen A. Douglass,	Adams, Brown, Calhoun, Fulton, Greene, Jersey, Macoupin, Marquette, Peoria, Pike, Schuyler.
6.	Joseph P. Hoge, ...	Carroll, Hancock, Henderson, Henry, Jo Daviess, Knox, Lee, M'Donough, Mercer, Ogle, Rock Island, Stark, Stephenson, Warren, Whiteside, Winnebago.
7.	John J. Hardin, ...	Cass, Logan, Marshall, Mason, Menard, Morgan, Putnam, Sangamon, Scott, Tazewell, Woodford.

MISSOURI, (5.)

(*Elected by General Ticket.*)

Gustavus M. Bower,	John Jameson,
James B. Bowlin,	James H. Relfe.
James M. Hughes,	

MICHIGAN, (3.)

		Counties.
1.	Robert M'Clellan, ...	Hillsdale, Lenawee, Monroe, Washtenaw, Wayne.
2.	Lucius Lyon, ...	Allegan, Barry, Berrien, Branch, Calhoun, Cass, Eaton, Ionia, Jackson, Kalamazoo, Kent, Oceana, Ottawa, St. Joseph, Van Buren.
3.	James B. Hunt, ...	Chippewa, Clinton, Genesee, Ingham, Lapeer, Livingston, Mackinaw, Macomb, Oakland, Saginaw, Shiawassee, St. Clair.

DELEGATES FROM TERRITORIES.

FLORIDA.

David Levy.

WISKONSAN.

Henry Dodge.

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IOWA.

Augustus C. Dodge.

Caleb J. M'Nulty, Clerk, ... salary, $3,000

The Legislative Power is vested in a CONGRESS of the UNITED STATES, which is composed of a SENATE and a HOUSE OF REPRESENTATIVES.

The SENATE consists of two Members from each State, elected by the Legislatures thereof for the period of six years. Independently of the legislative powers which they exercise jointly with the House of Representatives, their consent is requisite for the confirmation of nominations to office made by the President, and the consent of two-thirds of the Senators present is also essential to the ratification of all Treaties concluded by him.

The HOUSE OF REPRESENTATIVES consists of members elected by the people of the different States according to their respective federal population, computed by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, *three-fifths* of all other persons. These numbers are ascertained by a decennial enumeration, or Census, of all the inhabitants of the United States, taken by the Marshals of the various Judicial Districts; and the *ratio* of *representation* (by which one representative cannot be allotted to less than 30,000 individuals,) is then designated by Congress; with this proviso, that each State shall have at least one representative.

The following table shows the ratio and the number of the House under each apportionment, viz.:

Year 1789—Fixed by the Constitution			65	Members.
" 1792	Ratio of	33,000	105	"
" 1802	"	33,000	141	"
" 1812	"	35,000	181	"
" 1822	"	40,000	212	"
" 1832	"	47,700	242*	"
" 1842	"	70,680	223	"

The last Census was taken in 1840, and the Apportionment Act of June 25th, 1842, allows to each State one member of the House of Representatives for every 70,680 of its Federal numbers, and one additional member for every *fraction* exceeding the half of that ratio; in the following manner:

* Including Arkansas, admitted into the Union in 1836, and Michigan, admitted in 1837.

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LEGISLATIVE DEPARTMENT.

States.	No. of Members.
Maine,	7
New Hampshire,	4
Massachusetts,	10
Rhode Island,	2
Connecticut,	4
Vermont,	4
New York,	34
New Jersey,	5
Pennsylvania,	24
Delaware,	1
Maryland,	6
Virginia,	15
North Carolina,	9
South Carolina,	7
Georgia,	8
Alabama,	7
Mississippi,	4
Louisiana,	4
Tennessee,	11
Kentucky,	10
Ohio,	21
Indiana,	10
Illinois,	7
Missouri,	5
Arkansas,	1
Michigan,	3
Total,	223

It is also directed by this Act, that the number of Representatives to which each State shall be entitled, shall (when more than one) be elected by *Districts*, composed of contiguous territory, equal in number to the number of Representatives to which the State may be entitled; no one District electing more than *one* Representative.

One *Delegate* is elected from each of the organized Territories.

The *compensation* of members of Congress and Delegates is $8 per day during the session, and an allowance of $8 for every twenty miles travelled by them in going to and returning from the seat of Government. The President of the Senate *pro tempore*, and the Speaker of the House of Representatives, receive $16 per day during the session.

PRESIDENTIAL ELECTORS

The number of Electors of President and Vice-President of the United States to which each State is entitled, (which is always equal to the number of its Senators and Representatives in Congress,) will appear in the subjoined table, arranged in numerical order.

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States.	Electoral Votes.	States.	Electoral Votes.
1. New York,	36	14. Illinois,	9
2. Pennsylvania,	26	15. Maryland,	8
3. Ohio,	23	16. New Jersey,	7
4. Virginia,	17	17. Missouri,	7
5. Tennessee,	13	18. Connecticut,	6
6. Kentucky,	12	19. New Hampshire,	6
7. Massachusetts,	12	20. Vermont,	6
8. Indiana,	12	21. Louisiana,	6
9. North Carolina,	11	22. Mississippi,	6
10. Georgia,	10	23. Michigan,	5
11. South Carolina,	9	24. Rhode Island,	4
12. Alabama,	9	25. Delaware,	3
13. Maine,	9	26. Arkansas,	3
		Total,	275

Necessary to an election by the people, ... 138

III. JUDICIAL.

SUPREME COURT.

Names and Offices.		Residence.	Compensation.
Roger B. Taney, Chief Justice,		Baltimore, Md.	$5,000
Joseph Story, Associate Justice,		Cambridge, Mass.	4,500
John McLean,	do.	Cincinnati, Ohio,	4,500
James M. Wayne,	do.	Savannah, Georgia,	4,500
John Catron,	do.	Nashville, Ten.	4,500
John McKinley,	do.	Florence, Ala.	4,500
Peter V. Daniel,	do.	Richmond, Va.	4,500
Two vacancies.			
William T. Carroll, Clerk,		Washington, D. C.	Fees, &c.

ATTORNEY GENERAL,

John Nelson, ... Baltimore, Maryland, ... 4,000

REPORTER OF THE DECISIONS OF THE SUPREME COURT.

Benjamin C. Howard, ... Baltimore, Maryland, ... 1,300

The Supreme Court of the United States is held at Washington, and has an annual session commencing on the first Monday of December.

CIRCUIT COURTS OF THE UNITED STATES.

The United States are divided into nine judicial circuits, in each of which a Circuit Court is held at least once a year in each state within the circuit, by a justice of the Supreme Court assigned to the circuit, and by the district judge of the district or state in which the court is held.

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CIRCUIT COURTS.

FIRST CIRCUIT.

Presiding Judge, Joseph Story.

MAINE.

Portland, 1st of May; and 1st of October.

NEW HAMPSHIRE.

Portsmouth, 8th of May; *Exeter*, 8th of October.

MASSACHUSETTS.

Boston, 15th of May and 15th of October.

RHODE ISLAND.

Newport, 15th of June; *Providence*, 15th of November.

SECOND CIRCUIT.

Presiding Judge, Smith Thompson.

VERMONT.

Windsor, 21st of May; *Rutland*, 3d of October.

CONNECTICUT.

New Haven, 4th Tuesday of April; *Hartford*, 3d Tuesday in Sept.

NEW YORK, SOUTHERN DISTRICT.

New York, last Monday of Feb.; 1st Monday of April; last Monday in July; and last Monday of November.

NEW YORK, NORTHERN DISTRICT.

Albany, third Tuesday of October; *Canandaigua*, Tuesday next after third Monday of June.

THIRD CIRCUIT.

Presiding Judge, Henry Baldwin.

NEW JERSEY.

Trenton, 1st of April and 1st of October.

PENNSYLVANIA, EASTERN DISTRICT.

Philadelphia, 11th of April and 11th of October.

PENNSYLVANIA, WESTERN DISTRICT.

Pittsburgh, 3d Mon's. of May & Nov.; *Williamsport*, Mon. Jun. & Sept.

FOURTH CIRCUIT.

Presiding Judge, Roger B. Taney.

DELAWARE.

Newcastle, Tuesday following 4th Monday of May; *Dover*, Tuesday following 3d Monday of October.

MARYLAND.

Baltimore, 1st Monday of November.

VIRGINIA, EASTERN DISTRICT.

Richmond, 1st Monday of May and 4th Monday of November.

VIRGINIA, WESTERN DISTRICT.

Lewisburg, 1st Monday in August; *Wheeling*, 25th of August.

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CIRCUIT COURTS.

FIFTH CIRCUIT.

Presiding Judge, John McKinley.

ALABAMA, SOUTHERN DISTRICT.

Mobile, 2d Monday of March and 4th Monday of November.

ALABAMA, NORTHERN DISTRICT.

Huntsville, 1st Monday of June.

LOUISIANA.

New Orleans, 1st Monday of April and 3d Monday of December.

SIXTH CIRCUIT.

Presiding Judge, James M. Wayne.

NORTH CAROLINA.

Raleigh, 4th Monday of May and 2d Monday of December.

SOUTH CAROLINA.

Charleston, 2d Tuesday of April; *Columbia*, 4th Monday of Nov.

GEORGIA.

Savannah, Thursday following 1st Monday of May; *Milledgeville* Thursday following 1st Monday of November.

SEVENTH CIRCUIT.

Presiding Judge, John McLean.

OHIO.

Cincinnati, 1st Monday of July; *Columbus*, 3d Monday of December.

INDIANA.

Indianapolis, 1st Monday of December.

ILLINOIS.

Vandalia, last Monday of November.

MICHIGAN.

Detroit, 3d Monday of June and 2d Monday of October.

EIGHTH CIRCUIT.

Presiding Judge, John Catron.

KENTUCKY.

Frankfort, 1st Monday of May and 3d Monday of November.

TENNESSEE.

Nashville, 1st Monday of March and September; *Knoxville*, 3d Mondays in Oct. and April; *Jackson*, 2d Monday of Oct. and April.

NINTH CIRCUIT.

Presiding Judge, Peter V. Daniel.

MISSISSIPPI.

Jackson, 1st Monday of May and November.

ARKANSAS.

Little Rock, 4th Monday of March.

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UNITED STATES

NAMES, RESIDENCE AND COMPENSATION OF

Of each District in

JUDGES.				ATTOR-
DISTRICTS.	NAMES.	RESIDENCE.	Compensation.	NAMES.
Maine,	Ashur Ware,	Portland,	$1,800	Gorham Parks,
New Hampshire,	Matthew Harvey,	Hopkinton,	1,000	Joel Eastman,
Massachusetts,	Peleg Sprague,	Boston,	2,500	Franklin Dexter,
Connecticut,	Andrew T. Judson,	Canterbury,	1,500	Charles Chapman,
Rhode Island,	John Pitman,	Providence,	1,500	Richard W. Greene,
Vermont,	Samuel Prentiss,	Montpelier,	1,200	Charles Davis,
N. District N. York,	Alfred Conkling,	Auburn,	2,000	Joshua A. Spencer,
S. District N. York,	Samuel R. Betts,	New York,	3,500	Ogden Hoffman,
New Jersey,	Philemon Dickerson,	Paterson,	1,500	James S. Green,
E. District Penna.	Archibald Randall,	Philadelphia,	2,500	H. M. Watts,
W. District Penna.	Thomas Irwin,	Pittsburg,	1,800	Wm. O. Robinson,
Delaware,	Willard Hall,	Wilmington,	1,500	Wm. H. Rogers,
Maryland,	Upton S. Heath,	Baltimore,	2,000	Z. Collins Lee,
Virginia, E. Dist.	Jas. D. Hallyburton,	Southampton,	1,800	Robert C. Nicholas,
Virginia, W. Dist.	I. S. Pennybacker,	Harrisonburg,	1,600	Moses C. Good,
North Carolina,	Henry Potter,	Raleigh,	2,000	Duncan K. M'Rae,
South Carolina,	Robert B. Gilchrist,	Charleston,	2,500	Edward M'Crady,
Georgia,	John C. Nicoll,	Savannah,	2,500	Henry R. Jackson,
Alabama, N. Dist.	William Crawford,	Mobile,	2,500	Joseph A. S. Acklin,
Alabama, S. Dist.				George J. S. Walker,
Mississippi, N. Dist.	Samuel J. Gholson,	Athens,	2,000	Oscar F. Bledsoe,
Mississippi, S. Dist.				Richard M. Gaines,
Louisiana, E. Dist.	Theo. H. M'Caleb,	New Orleans,	3,000	Bailie Peyton,
Louisiana, W. Dist.				Caleb L. Swayze,
Tennessee, E. Dist.	Morgan W. Brown,	Nashville,	1,500	Thomas C. Lyon,
Tennessee, M. Dist.				John M. Lea,
Tennessee, W. Dist.				H. W. M'Corry,
Kentucky,	Thomas B. Monroe,	Frankfort,	1,500	P. S. Loughborough,
Ohio,	Humph. H. Leavitt,	Steubenville,	1,000	Charles Anthony,
Indiana,	E. M. Huntington,	Terre Haute,	1,000	Courtland Cushing,
Illinois,	Nathaniel Pope,	Kaskaskia,	1,000	Justin Butterfield,
Missouri,	Robert W. Wells,	Jefferson City,	1,200	Wm. M. M'Pherson,
Arkansas,	Benjamin Johnson,	Little Rock,	2,000	Saml. H. Hempstead,
Michigan,	Ross Wilkins,	Detroit,	1,500	George C. Bates,
Florida, E. Dist.	Isaac H. Bronson,	St. Augustine,	2,300	Thomas Douglas,
Florida, M. Dist.	Saml. J. Douglass,	Tallahassee,	1,800	Charles S. Sibley,
Florida, W. Dist.	Dillon Jordan, Jr	Pensacola,	1,800	Walker Anderson,
Florida, S. Dist.	William Marvin,	Key West,	2,300	Geo. W. Macrae,
Florida, Apalach. D.	Samuel W. Carmack,	St. Joseph's,	1,800	Geo. S. Hawkins,
Wiskonsan,	C. Dunn, (chief judge)	Du Buque,	1,800	T. W. Sutherland,
Iowa,	Charles Mason, do.	Burlington,	1,800	John G. Deshler,
District of Columbia,	William Cranch, do.	Washington,	2,700	Philip R. Fendall,

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DISTRICT COURTS.

THE JUDGES, ATTORNEYS AND MARSHALS,

the United States.

NEYS.		MARSHALS.			
RESIDENCE.	Compensation.	NAMES.	RESIDENCE.	Compensation.	DISTRICTS.
Bangor, ...	$200 & fees	J. D. Kinsman, ...	Portland, ...	$200 & fees	Maine.
Conway, ...	200 & fees	Israel W. Kelley, .	Salisbury, ...	200 & fees	New Hampshire.
Boston, ...	fees	Solomon Lincoln, .	Boston, ...	fees	Massachusetts.
Hartford, ...	200 & fees	Benning Mann, ...	Hartford, ...	200 & fees	Connecticut.
Providence, ..	200 & fees	S. Hartshorne, ...	Providence, ..	200 & fees	Rhode Island.
Danville, ...	200 & fees	William Barron, ..	Bradford, ...	200 & fees	Vermont.
Utica, ...	200 & fees	Clark Robinson, ..	Buffalo, ...	200 & fees	N. District N. Y.
New York, ..	fees	Silas M. Stilwell, .	New York, ..	fees	S. District N. Y.
Princeton, ..	200 & fees	J. A. Simpson, ...	Trenton, ...	200 & fees	New Jersey.
Philadelphia, .	fees	George M. Keim, ..	Philadelphia,	fees	E. District Pa.
Pittsburg, ...	200 & fees	Henry C. Bosler, ..	Meadville, ...	200 & fees	W. District Pa.
New Castle, ..	200 & fees	Nathaniel Wolfe, .	New Castle, ..	200 & fees	Delaware.
Baltimore, ...	fees	Moreau Forrest, ..	Baltimore, ...	fees	Maryland.
Richmond, ...	200 & fees	E. Christian, ...	Richmond, ...	200 & fees	Va. E. District.
Wheeling, ...	200 & fees	James Points, ...	Staunton, ...	200 & fees	Va. W. District.
Fayetteville, .	200 & fees	Wesley Jones, ...	Raleigh, ...	400 & fees	N. Carolina.
Charleston, ..	fees	T. D. Condy, ...	Charleston, ..	fees	S. Carolina.
Savannah, ...	200 & fees	H. Willingham, ...	Milledgeville,	200 & fees	Georgia.
Huntsville, ...	200 & fees	Benj. Patterson, ..	Huntsville, ..	200 & fees	Ala. N. District.
Cahawba, ...	200 & fees	Wm. Armistead, ..	Mobile, ...	200 & fees	Ala. S. District.
Columbus, ...	200 & fees	A. K. M'Clung, ...	Pontotoc, ...	200 & fees	Miss. N. District.
Natchez, ...	200 & fees	Anderson Miller, .	Vicksburg, ...	200 & fees	Miss. S. District.
New Orleans,	200 & fees	A. S. Robertson, ..	New Orleans,	200 & fees	La. E. District.
Opelousas, ...	200 & fees	Wm. H. Bassett, ..	Washington,	200 & fees	La. W. District.
Knoxville, ...	200 & fees	R. M. Woods, ...	Greenville, ..	200 & fees	Tenn. E. Dist.
Nashville, ...	200 & fees	B. H. Sheppard, ...	Nashville, ...	200 & fees	Tenn. M. Dist.
Jackson, ...	200 & fees	R. J. Chester, ...	Jackson, ...	200 & fees	Tenn. W. Dist.
Louisville, ...	200 & fees	W. B. Blackburn, Jr.	Versailles, ...	200 & fees	Kentucky,
Springfield, ...	200 & fees	John M'Elvaine, ..	Columbus, ...	200 & fees	Ohio.
Madison, ...	200 & fees	Robert Hanna, ...	Indianapolis,	200 & fees	Indiana.
Chicago, ...	200 & fees	Thomas M. Hope, .	Springfield, ..	200 & fees	Illinois.
St. Louis, ...	200 & fees	Wm. C. Anderson,	St. Louis, ...	200 & fees	Missouri.
Little Rock, ..	200 & fees	Henry M. Rector, .	Little Rock, .	200 & fees	Arkansas.
Detroit, ...	200 & fees	Levi S. Humphrey,	Detroit, ...	200 & fees	Michigan.
St. Augustine,	200 & fees	John Beard, ...	St. Augustine,	200 & fees	Florida, E. Dist.
Tallahassee, ..	200 & fees	John G. Camp, ...	Tallahassee, .	200 & fees	Florida, M. Dist.
Pensacola, ...	200 & fees	Ebenezer Dorr, ...	Pensacola, ...	200 & fees	Florida, W. Dist.
Key West, ...	200 & fees	Joseph B. Brown, .	Key West, ...	200 & fees	Florida, S. Dist.
Apalachicola,	200 & fees	Robert Myers, ...	Apalachicola,	200 & fees	Fl. Apalach. D.
Madison, ...	250 & fees	Daniel Hugunin, ..	Southport, ...	200 & fees	Wiskonsan.
Bloomington, .	250 & fees	Isaac Leffler, ...	Burlington, ..	200 & fees	Iowa.
Washington, .	fees	Alex. Hunter, ...	Washington,	fees	Dist. Columbia.

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DISTRICT COURTS OF THE UNITED STATES.

The District Courts of the United States are held as follows:

MAINE—*Portland*, 1st Tuesdays in February and December; *Bangor*, 4th Tuesday in June; *Wiscasset*, 1st Tuesday in September.

NEW HAMPSHIRE—*Portsmouth*, 3d Tuesday in March and September; *Exeter*, 3d Tuesday in June and December.

VERMONT—*Rutland*, 6th of October; *Windsor*, 24th of May.

MASSACHUSETTS—*Boston*, 3d Tuesday in March, 4th Tuesday in June, 2d Tuesday in September, and 1st Tuesday in December.

RHODE ISLAND—*Newport*, 2d Tuesday in May, and 3d in October; *Providence*, 1st Tuesdays in August and February.

CONNECTICUT—*New Haven*, 4th Tuesday in February and August; *Hartford*, 4th Tuesday in May and November.

NEW YORK, S. DISTRICT—*New York*, 1st Tuesday of each month.

NEW YORK, N. DISTRICT—*Albany*, 3d Tuesday in January; *Utica*, 2d Tuesday in July; *Rochester*, 3d Tuesday in May; *Buffalo*, 2d Tuesday in October. One term annually in the county of St. Lawrence, Clinton, or Franklin, at such time and place as the judge may direct.

NEW JERSEY—*New Brunswick*, 2d Tuesday in March and September; *Burlington*, 3d Tuesday in May and November.

PENNSYLVANIA; E. DISTRICT—*Philadelphia*, 3d Monday in February, May, August, and November.

PENNSYLVANIA, W. DISTRICT—*Pittsburgh*, 1st Monday in May, and 3d Monday in October; *Williamsport*, 3d Monday in June and 1st Monday in October,

DELAWARE—*Dover*, Tuesday after 3d Monday of March, and Tuesday after 4th Monday of September; *New Castle*, 3d Tuesday of June, and 2d Tuesday of December.

MARYLAND—*Baltimore*, on the 1st Tuesdays in March, June, September, and December.

VIRGINIA, E. DISTRICT—*Richmond*, 12th of May and 12th of November; *Norfolk*, 1st of May and 1st of November.

VIRGINIA, W. DISTRICT—*Staunton*, 1st of May and 1st of October; *Wythe Court House*, 3d Mondays in April and September; *Charleston*, Wednesdays after 2d Mondays in April and September; *Clarksburg*, 4th Mondays in May and October; *Wheeling*, 25th March and 25th October.

N. CAROLINA—*Edenton*, 3d Monday in April and October; *Newbern*, 4th Monday in April and October; *Wilmington*, 1st Monday after the 4th Monday in April and October.

S. CAROLINA—*Charleston*, 3d Monday in March and September; 1st Monday in July and 2d Monday in December; *Laurens Court House*, the next Tuesday after the adjournment of the Circuit Court at Columbia.

GEORGIA—*Savannah*, Thursday after the 1st Monday in May; *Milledgeville*, Thursday after the 1st Monday in November.

ALABAMA, S. DISTRICT—*Mobile*, 2d Monday in March and 4th Monday in November.

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JUDICIAL DEPARTMENT.

ALABAMA, N. DISTRICT—*Huntsville*, 1st Monday in June.
MISSISSIPPI—*Jackson*, 1st Mondays in May and November.
LOUISIANA, E. DISTRICT—*New Orleans*, 1st Monday in April and 3d Monday in December.
LOUISIANA, W. DISTRICT—*Opelousas*, 3d Monday in March.
TENNESSEE—*Nashville*, 1st Monday in March and September; *Knoxville*, 3d Monday in October and April; *Jackson*, 2d Monday in October and April.
KENTUCKY—*Frankfort*, 1st Monday in May and 3d Monday in Nov.
OHIO—*Cincinnati*, 1st Monday in July; *Columbus*, 3d Monday in Dec.
MICHIGAN—*Detroit*, 3d Monday in June and 2d Monday in October.
INDIANA—*Indianapolis*, 1st Monday in December.
ILLINOIS—*Vandalia*, last Monday in November.
MISSOURI—*St. Louis*, 1st Monday in April.
ARKANSAS—*Little Rock*, 4th Monday in March.
DISTRICT OF COLUMBIA—*Washington*, 4th Mondays in March and November; *Alexandria*, 1st Mondays in May and October.

In addition to the abovementioned stated courts, the District Judges have power to hold special courts in their respective districts at their discretion.

PRINCIPAL EXECUTIVE, LEGISLATIVE AND JUDICIAL OFFICERS OF THE UNITED STATES, FROM THE REVOLUTION TO THE PRESENT TIME.

1. *Under the Revolutionary Government.*

PRESIDENTS OF THE CONTINENTAL CONGRESS FROM 1774 TO 1789.

Peyton Randolph,	Virginia,	Sept. 5, 1774
John Hancock,	Massachusetts,	May 24, 1775
Henry Laurens,	South Carolina,	Nov. 1, 1777
John Jay,	New York,	Dec. 10, 1778
Samuel Huntingdon,	Connecticut,	Sept. 28, 1779
Thomas M'Kean,	Delaware,	July 10, 1781
John Hanson,	Maryland,	Nov. 5, 1781
Elias Boudinot,	New Jersey,	Nov. 4, 1782
Thomas Mifflin,	Pennsylvania,	Nov. 3, 1783
Richard Henry Lee,	Virginia,	Nov. 30, 1786
Nathaniel Gorham,	Massachusetts,	June 6, 1786
Arthur St. Clair,	Pennsylvania,	Feb. 2, 1787
Cyrus Griffin,	Virginia,	Jan. 22, 1788

2. *Under the Constitution.*

PRESIDENTS.

George Washington, Va.	1789
John Adams, Mass.	1797
Thomas Jefferson, Va.	1801
James Madison, Va.	1809
James Monroe, Va.	1817
John Q. Adams, Mass.	1825
Andrew Jackson, Tenn.	1829
Martin Van Buren, N. Y.	1837
Wm. Henry Harrison, Ohio,	1841
John Tyler, Va., Vice Pres., succeeded William Henry Harrison, who died on the 4th of April, 1841,	1841

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VICE PRESIDENTS.

John Adams, Mass. 1789
Thomas Jefferson, Va. 1797
Aaron Burr, N. Y. 1801
George Clinton, N. Y. 1805
Elbridge Gerry, Mass. 1813
Daniel D. Tompkins, N. Y. .. 1817
John C. Calhoun, S. C. 1825
Martin Van Buren, N. Y. 1833
Richard M. Johnson, Ky. 1837
John Tyler, who became President, on the death of President Harrison, since which the office has been vacant, . 1841

SECRETARIES OF STATE.

Thomas Jefferson, Va. 1789
Edmund Randolph, Va. 1794
Timothy Pickering, Mass. ... 1795
John Marshall, Va, ... 1800
James Madison, Va. 1801
Robert Smith, Mass. 1809
James Monroe, Va. 1811
John Q. Adams, Mass. 1817
Henry Clay, Ky. 1825
Martin Van Buren, N. Y. 1829
Edward Livingston, La. 1831
Louis M'Lane, Del. 1833
John Forsyth, Geo. 1835
Daniel Webster, Mass. 1841
Hugh S. Legare, S. C. 1843
Abel P. Upshur, Va. 1843
John C. Calhoun, S. C. 1844

SECRETARIES OF THE TREASURY.

Alexander Hamilton, N. Y. .. 1789
Oliver Wolcott, Conn. 1795
Samuel Dexter, Mass. 1801
Albert Gallatin, Pa. 1802
George W. Campbell, Tenn. . 1814
Alexander J. Dallas, Pa. 1814
William H. Crawford, Geo. .. 1817
Richard Rush, Pa. 1825
Samuel D. Ingham, Pa. 1829
Louis M'Lane, Del. 1831
William J. Duane, Pa. 1833
Roger B. Taney, Md. 1833
Levi Woodbury, N. H. 1834
Thomas Ewing, Ohio, ... 1841
Walter Forward, Pa. 1841
John C. Spencer, N. Y. 1843
George M. Bibb, Ky. 1844

SECRETARIES OF WAR.

Henry Knox, Mass. 1789
Timothy Pickering, Pa. 1795
James M'Henry, Md. 1796
Samuel Dexter, Mass. 1800
Roger Griswold, Conn. 1801
Henry Dearborn, Mass. 1801
William Eustis, Mass. 1809
John Armstrong, N. Y. 1813
William H. Crawford, Geo. .. 1815
John C. Calhoun, S. C. 1817
James Barbour, Va. 1825
Peter B. Porter, N. Y. 1828
John H. Eaton, Tenn. 1829
Lewis Cass, Michigan, ... 1831
Joel R. Poinsett, S. C. 1837
John Bell, Tenn. 1841
John C. Spencer, N. Y. 1841
James M. Porter, Pa. 1843
William Wilkins, Pa. 1844

SECRETARIES OF THE NAVY.

George Cabot, Mass. 1796
Benjamin Stoddard, Md. 1798
Robert Smith, Md. 1802
Jacob Crowninshield, Mass. .. 1805
Paul Hamilton, S. C. 1809
William Jones, Pa. 1813
B. W. Crowninshield, Mass. . 1814
Smith Thompson, N. Y. 1818
Samuel L. Southard, N. J. 1823
John Branch, N. C. 1829
Levi Woodbury, N. H. 1831
Mahlon Dickerson, N. J. 1834
James K. Paulding, N. Y. 1838
George E. Badger, N. C 1841
Abel P. Upshur, Va. 1841
David Henshaw, Mass. 1843
Thomas W. Gilmer, Va. 1844
John Y. Mason, Va. 1844

POSTMASTERS-GENERAL.

Samuel Osgood, Mass. 1789
Timothy Pickering, Mass. ... 1791
Joseph Habersham, Geo. 1795
Gideon Granger, Conn. 1802
Return J. Meigs, Ohio, ... 1814

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John M'Lean, Ohio, ...1823
William T. Barry, Ky.....1829
Amos Kendall, Ky.....1835
John M. Niles, Conn.....1840
Francis Granger, N. Y.....1841
Charles A. Wickliffe, Ky.....1841

CHIEF JUSTICES OF THE SUPREME COURT.

John Jay, N. Y.....1789
William Cushing, Mass.....1796
Oliver Ellsworth, Conn.....1796
John Jay, N. Y.....1800
John Marshall, Va.....1801
Roger B. Taney, Md.....1836

ATTORNEYS-GENERAL.

Edmund Randolph, Va.....1789
William Bradford, Pa.....1794
Charles Lee, Va.....1795
Levi Lincoln, Mass.....1801
Robert Smith, Md.....1805
John Brackenridge, Ky.....1806
Cæsar A. Rodney, Del.....1807
William Pinckney, Md.....1811
Richard Rush, Pa.....1814
William Wirt, Va.....1817
John M'Pherson Berrien, Geo. 1829
Roger B. Taney, Md.....1831
Benjamin F. Butler, N. Y....1834
Felix Grundy, Tenn.....1838
Henry D. Gilpin, Pa.....1839
John J. Crittenden, Ky.....1841
Hugh S. Legare, S. C.....1841
John Nelson, Md.....1843

SPEAKERS OF THE HOUSE OF REPRESENTATIVES.

Frederick A. Muhlenberg, Pa. 1789
Jonathan Trumbull, Conn....1791
Frederick A. Muhlenberg, Pa. 1793
Jonathan Dayton, N. J.....1795
Theodore Sedgwick, Mass....1799
Nathaniel Macon, N. C.....1801
Joseph B. Varnum, Mass.....1803
Nathaniel Macon, N. C.....1805
Joseph B. Varnum, Mass.....1807
Henry Clay, Ky.....1811
Langdon Cheves, S. C.....1814
Henry Clay, Ky.....1815
John W. Taylor, N. Y.....1820
Philip P. Barbour, Va.....1821
Henry Clay, Ky.....1823
John W. Taylor, N. Y.....1825
Andrew Stevenson, Va.....1827
John Bell, Tenn.....1834
James K. Polk, Tenn.....1835
Robert M. T. Hunter, Va....1839
John White, Ky.....1841
John W. Jones, Va.....1843

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POPULATION OF THE UNITED STATES IN 1790, 1800, 1810, 1820, 1830, AND 1840.

FROM THE OFFICIAL DOCUMENTS.

STATES.	1790.	1800.	1810.	1820.	1830.	1840.	Numerical arrangement 1840.
							Class.
Maine	96,540	151,719	228,705	298,335	399,455	501,793	13
New Hampshire	141,899	183,762	214,300	244,161	269,328	284,574	22
Massachusetts	378,717	423,245	472,040	523,287	610,408	737,699	8
Rhode Island	69,110	69,122	77,031	83,059	97,199	108,830	24
Connecticut	238,141	251,002	262,042	275,202	297,675	309,978	20
Vermont	85,416	154,465	217,713	235,764	280,652	291,948	21
New York	340,120	586,756	959,049	1,372,812	1,913,006	2,428,921	1
New Jersey	184,139	211,949	245,555	277,575	320,823	373,306	18
Pennsylvania	434,373	602,365	810,091	1,049,458	1,348,233	1,724,033	2
Delaware	59,096	64,273	72,674	72,749	76,748	78,085	26
Maryland	319,728	341,548	380,546	407,350	447,040	469,232	15
District of Columbia	.....	14,093	24,023	33,039	39,834	43,712	28
Virginia	748,308	880,200	974,622	1,065,379	1,211,405	1,239,797	4
North Carolina	393,751	478,103	555,500	638,829	737,987	753,419	7
South Carolina	249,073	345,591	415,115	502,741	581,185	594,398	11
Georgia	82,548	162,101	252,433	340,987	516,823	691,392	9
Kentucky	73,077	220,955	406,511	564,317	687,917	779,828	6
Tennessee	35,791	105,602	261,727	422,813	681,904	829,210	5
Ohio	.....	45,365	230,760	581,434	937,903	1,519,467	3
Indiana	.....	4,875	24,520	147,178	343,031	685,866	10
Mississippi	.....	8,850	40,352	75,448	136,621	375,651	17
Illinois	.....	.....	12,282	55,211	157,445	476,183	14
Louisiana	.....	.....	76,556	153,407	215,529	352,411	19
Missouri	.....	.....	20,845	66,586	140,455	383,702	16
Alabama	.....	.....	.....	127,901	309,527	590,756	12
Michigan	.....	.....	4,762	8,896	31,639	212,267	23
Arkansas	.....	.....	.....	14,273	30,388	97,574	25
Florida territory	.....	.....	.....	.....	34,730	54,477	21
Wiskonsin territory	.....	.....	.....	.....	.....	30,945	30
Iowa territory	.....	.....	.....	.....	.....	43,112	29
On board U. S. vessels	.....	.....	.....	.....	11,130	6,100	.....
	3,929,827	5,305,940	7,239,814	9,638,191	12,866,020	17,068,666	

Increase per cent. each ten years:

From 1790 to 1800 ..... 35 per cent.
From 1800 to 1810 ..... 36½ per cent.
From 1810 to 1820 ..... 33 per cent.
From 1820 to 1830 ..... 33⅓ per cent.
From 1830 to 1840 ..... 32¾ per cent.

Average increase each 10 years for the last 50 years, 34 15-100 per cent.; at this rate, the number of inhabitants in the United States would be:

In 1850 ..... 22,872,268.
In 1860 ..... 30,649,182.
In 1870 ..... 41,070,363.

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POPULATION OF CITIES AND TOWNS, BY THE CENSUS OF 1840.

New York,	312,710	Newport,	8,333
Philadelphia,	258,832	Portsmouth, N. H.	7,887
Baltimore,	102,313	Wheeling,	7,885
New Orleans,	102,103	Taunton,	7,645
Boston,	93,383	Paterson,	7,597
Cincinnati,	46,338	Worcester,	7,499
Brooklyn,	36,233	Georgetown,	7,312
Albany,	33,721	Mount Pleasant, N. Y.	7,307
Charleston,	29,261	Newburyport,	7,161
Washington,	23,346	Seneca,	7,073
Providence,	23,171	Lexington,	6,977
Louisville,	21,210	Nashville,	6,929
Pittsburgh,	21,115	Schenectady,	6,784
Lowell,	20,786	Gloucester,	6,738
Rochester,	20,191	Warwick,	6,626
Richmond,	20,153	Concord,	6,458
Troy,	19,334	Dover,	6,458
Buffalo,	18,213	Portsmouth, Va.,	6,446
Newark,	17,290	Plattsburgh,	6,416
St. Louis,	16,469	Lynchburg,	6,395
Portland,	15,218	Fall River,	6,350
Salem, Mass.,	15,082	Augusta, Ga.,	6,303
New Haven,	12,960	Thomaston,	6,227
Utica,	12,782	Cleveland,	6,071
New Bedford,	12,680	Dayton,	6,067
Mobile,	12,672	Nashua,	6,054
Charlestown,	11,484	Columbus, O.,	6,048
Savannah,	11,214	Harrisburg,	5,980
Petersburg,	11,137	Kingston,	5,824
Salina,	11,014	Williamsburg, N. Y.,	5,680
Springfield,	10,985	Rome,	5,680
Norfolk,	10,920	Hudson,	5,672
Opelousas,	10,705	Marblehead,	5,575
Fishkill,	10,437	New London,	5,519
Allegheny,	10,089	Middleborough, Mass.	5,505
Poughkeepsie,	10,006	Catskill,	5,339
Smithfield, R. I.,	9,537	Augusta, Me.,	5,314
Hartford,	9,468	Plymouth,	5,281
Lynn,	9,367	Cumberland,	5,225
Lockport,	9,125	Andover,	5,207
Detroit,	9,102	Steubenville,	5,203
Roxbury,	9,089	Fredericktown, Md.	5,182
Nantucket,	9,012	Bath, Me.,	5,141
Newburgh,	8,933	Danvers, Mass.	5,020
Bangor,	8,627	Easton,	4,865
Alexandria,	8,459	Natchez,	4,800
Lancaster,	8,417	York, Pa.	4,779
Reading,	8,410	Zanesville,	4,766
Cambridge,	8,409	Wilmington, N. C.	4,744
Wilmington, Del.,	8,367	Columbia, S. C.	4,740

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COMPARATIVE VIEWS OF THE CENSUS OF 1840.

INCREASE OF POPULATION, 1830 TO 1840.

TABLE I.

Showing the population by census of 1830 and 1840—the numerical increase, and the ratio per cent. increase in ten years. in each State and Territory.

STATES.	Total population in 1830.	Total population in 1840.	Numerical increase since 1830.	Ratio per ct. increase in ten years.
Maine	399,455	501,793	102,338	25.61
New Hampshire	269,328	284,574	15,246	5.66
Massachusetts	610,408	737,699	127,291	20.85
Rhode Island	97,199	108,830	11,631	11.96
Connecticut	297,675	309,978	12,303	4.13
Vermont	280,652	291,948	11,296	4.02
New York	1,918,608	2,428,921	510,313	26.59
New Jersey	320,823	373,306	52,483	16.35
Pennsylvania	1,348,233	1,724,033	375,800	27.87
Delaware	76,748	78,085	1,337	1.74
Maryland	447,040	469,232	22,192	4.96
Virginia	1,211,405	1,239,797	28,392	2.34
North Carolina	737,987	753,419	15,432	2.09
South Carolina	581,185	594,398	13,213	2.27
Georgia	516,823	691,392	174,569	33.77
Alabama	309,527	590,756	281,229	90.85
Mississippi	136,621	375,651	239,030	174.95
Louisiana	215,739	352,411	136,672	63.35
Tennessee	681,904	829,210	147,306	21.60
Kentucky	687,917	779,828	91,911	13.36
Ohio	937,903	1,519,467	581,564	62.00
Indiana	343,031	685,866	342,835	99.94
Illinois	157,445	476,183	318,738	202.44
Missouri	140,455	383,702	243,247	173.18
Michigan	31,639	212,267	180,628	570.90
Arkansas	30,388	97,574	67,186	221.09
Florida	34,730	54,477	19,747	56.85
District of Columbia	39,834	43,712	3,878	9.73
Wiskonsan		30,945	30,945	
Iowa		43,112	43,112	
	12,860,702	17,062,566	4,201,864	32.67
Navy	5,318	6,100	782	14.70
Total	12,866,020	17,068,666	4,202,646	32.66

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INCREASE OF POPULATION, 1830 TO 1840.

TABLE II.

Showing the sectional increase.

STATES.	Total population in 1830.	Total population in 1840.	Numerical increase in 10 years.	Ratio per ct. increase in ten years.
NEW ENGLAND STATES.				
Maine	399,455	501,793	102,338	25.61
New Hampshire	269,328	284,574	15,246	5.66
Massachusetts	610,408	737,699	127,291	20.85
Rhode Island	97,199	108,830	11,631	11.96
Connecticut	297,675	309,978	12,303	4.13
Vermont	280,652	291,948	11,296	4.02
	1,954,717	2,234,822	280,105	14.32
MIDDLE STATES.				
New York	1,918,608	2,428,921	510,313	26.59
New Jersey	320,823	373,306	52,483	16.35
Pennsylvania	1,348,233	1,724,033	375,800	27.87
Delaware	76,748	78,085	1,337	1.74
	3,664,412	4,604,345	939,933	25.65
SOUTHERN STATES.				
Maryland	447,040	469,232	22,192	4.96
Virginia	1,211,405	1,239,797	28,392	2.34
North Carolina	737,987	753,419	15,432	2.09
South Carolina	581,185	594,398	13,213	2.27
Georgia	516,823	691,392	174,569	33.77
Alabama	309,527	590,756	281,229	90.85
Mississippi	136,621	375,651	239,030	174.95
Louisiana	215,739	352,411	136,672	63.35
District of Columbia	39,834	43,712	3,878	9.73
Florida	34,730	54,477	19,747	56.85
	4,230,891	5,165,245	934,354	22,26
WESTERN STATES.				
Ohio	937,903	1,519,467	581,564	62.00
Kentucky	687,917	779,828	91,911	13.36
Tennessee	681,904	829,210	147,306	21.60
Indiana	343,031	685,866	342,835	99.94
Illinois	157,445	476,183	318,738	202.44
Michigan	31,639	212,267	180,628	570.90
Missouri	140,455	383,702	243,247	173.18
Arkansas	30,388	97,574	67,186	221.09
Wiskonsan		30,945	30,945	
Iowa		43,112	43,112	
	3,010,682	5,058,154	2,047,472	68.00

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TABLE III.

Density of each State, or population to a square mile.

	Square Miles.	Population.	Density.
Massachusetts,	7,800	737,699	94½
Rhode Island,	1,360	108,820	80
Connecticut,	4,674	309,978	66
New York,	46,000	2,428,921	54
New Jersey,	6,900	373,306	54
Maryland,	10,800	439,232	43½
Delaware,	2,068	78,085	39½
Pennsylvania,	43,950	1,724,033	39
Ohio,	39,000	1,519,467	38½
New Hampshire,	9,280	284,574	30½
Vermont,	10,212	291,943	28½
Tennessee,	41,300	829,210	20
Kentucky,	39,000	779,828	20
Virginia,	64,000	1,239,798	19½
South Carolina,	30,080	594,398	19½
Indiana,	36,250	685,866	18¾
North Carolina,	43,800	753,419	17¼
Maine,	32,000	501,793	15¼
Alabama,	50,800	590,756	11½
Georgia,	58,200	691,392	10½
Mississippi,	45,350	375,651	8½
Illinois	59,000	486,183	8
Louisiana,	48,220	352,411	7½
Missouri,	60,300	383,702	6½
Michigan,	54,000	212,267	4
Arkansas,	60,000	97,574	2
26 States,			26¾

MANUFACTURES OF THE UNITED STATES.

(*Compiled from the returns of the Census of* 1840.)

MACHINERY, Value of machinery manufactured,	$10,980,581
Number of men employed,	13,001
HARDWARE, CUTLERY, &c., Value of manufactured,	$6,451,967
No. of men employed,	5,492
NUMBER OF CANNON AND SMALL ARMS,	
Number of Cannon cast,	274
Small arms made,	88,073
Men employed,	1,744
PRECIOUS METALS, Value of manufactured,	$4,734,960
Number of men employed,	1,556
VARIOUS METALS, Value manufactured,	$9,779,442
Number of men employed,	6,677
GRANITE, MARBLE, &c., Value manufactured,	$2,442,950
Number of men employed,	3,734

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MANUFACTURES OF THE UNITED STATES.

BRICKS AND LIME, Value manufactured,	$9,735,945
Number of men employed,	22,807
Capital invested in preceding manufactures,	$20,620,869
WOOL, Number of fulling mills,	2,585
Woollen manufactories,	1,420
Value of manufactured goods,	$20,696,999
Number of persons employed,	21,342
Capital invested,	$15,765,124
COTTON, Number of cotton manufactories,	1,240
Spindles,	2,284,631
Dyeing and printing establishments,	129
Value of manufactured articles,	$46,350,453
Number of persons employed,	72,119
Capital invested,	$51,102,359
MIXED MANUFACTURES, Value of produce,	$6,545,503
Number of persons employed,	15,905
Capital invested,	$4,368,991
HATS, CAPS, BONNETS, &c., Value of hats and caps manutured,	$8,704,342
Value of straw bonnets manufactured,	$1,476,505
Number of persons employed,	20,176
Capital invested,	$4,485,300
LEATHER, TANNERIES, SADDLERIES, &c.	
Number of tanneries,	8,229
Sides of sole leather tanned,	3,463,611
upper do. do.	3,781,868
Number of men employed,	26,018
Capital invested,	$15,650,929
All other manufactures of leather, saddleries, &c.	17,136
Value of manufactured articles,	$33,134,403
Capital invested,	$12,881,262
SOAP AND CANDLES, Number of pounds of soap,	49,820,497
Number of pounds of tallow candles,	17,904,507
Number of pounds of spermaceti and wax candles,	2,936,951
Number of men employed,	5,641
Capital invested,	$2,757,273
DISTILLED AND FERMENTED LIQUORS.	
Number of distilleries,	10,306
gallons produced,	41,402,627
breweries,	406
Number of gallons produced,	23,267,730
men employed,	12,223
Capital invested,	$9,147,368
POWDER MILLS, Number of powder mills,	137
Pounds of gunpowder,	8,977,348
Number of men employed,	496
Capital invested,	$875,875

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Drugs, Medicines, Paints, and Dyes.	
Value of medicinal drugs, paints, dyes, &c.	$4,151,899
Value of turpentine and varnish produced,	$660,827
Number of men employed,	1,848
Capital invested,	$4,507,675
Glass, Earthenware, &c.	
Number of glass-houses,	81
cutting establishments,	34
men employed,	3,236
Value of manufactured articles, including looking-glasses,	$2,890,293
Capital invested,	$2,084,100
Number of potteries,	659
Value of manufactured articles,	$1,104,825
Number of men employed,	1,612
Capital invested,	$551,431
Sugar Refineries, Chocolate, &c.	
Number of sugar refineries,	43
Value of produce,	$3,259,700
chocolate manufactured,	$79,900
confectionary made,	$1,143,965
Number of men employed,	1,355
Capital invested,	$1,769,571
Paper, Number of paper manufactories,	426
Value of produce,	$5,641,495
all other manufactures of paper, playing cards, &c.	$511,597
Number of men employed,	4,726
Capital invested,	$4,745,429
Printing and Binding, Number of printing offices,	1,552
Number of binderies,	447
Number of daily newspapers,	138
weekly newspapers,	1,141
semi and tri-weekly,	125
periodicals,	227
men employed,	11,523
Capital invested,	$5,873,815
Cordage, Number of rope walks,	338
Value of produce,	$4,078,306
Number of men employed,	4,644
Capital invested,	$2,465,577
Musical Instruments, Value produced,	$923,924
Number of men employed,	908
Capital invested,	$734,370
Carriages and Wagons, Value produced,	$10,897,887
Number of men employed,	21,994
Capital invested,	$5,551,632
Mills, Number of flouring mills,	4,364
Barrels of flour manufactured,	7,404,562
Number of grist mills,	23,661

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Number of saw mills,	31,650
oil do.	843
Value of manufactures,	$76,545,246
Number of men employed,	60,788
Capital invested,	$65,858,470
SHIPS, Value of ships and vessels built,	7,016,094
FURNITURE, Value of furniture made,	7,555,405
Number of men employed,	18,003
Capital invested,	$6,989,971
HOUSES, Number of brick and stone houses built,	8,429
wooden houses,	45,684
men employed,	85,501
Value of constructing or building,	$41,917,401
ALL OTHER MANUFACTURES NOT ENUMERATED.	
Value,	$34,785,353
Capital invested,	$25,019,726
TOTAL CAPITAL invested in manufactures,	$267,726,579

III. EXPORTS.

1. DOMESTIC PRODUCE.

Summary Statement of the value of the exports, of the growth, produce, and manufacture of the United States, during the nine months, commencing on the 1st day of October, 1842, and ending on the 30th day of June, 1843.

THE SEA.

Fisheries—Dried fish, or cod fisheries,		$381,175
Pickled fish, or river fisheries, (herring, shad, salmon, mackerel,)		116,042
Whale and other fish oil,		803,774
Spermaceti oil,		310,768
Whale bone,		257,481
Spermaceti candles,		243,308
		$2,112,548

THE FOREST.

Skins and furs,		453,869
Ginseng,		193,870
Product of wood—		
Staves, shingles, boards, hewn timber,	$1,026,179	
Other lumber,	211,111	
Masts and spars,	19,669	
Oak bark and other dye,	39,538	
All manufactures of wood,	391,312	
Naval stores, tar, pitch, rosin, and turpentine,	475,357	
Ashes, pot and pearl,	541,004	
		2,704,170
		$3,351,909

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EXPORTS OF THE UNITED STATES.

AGRICULTURE.		
Product of animals—		
Beef, tallow, hides, horned cattle,	$1,092,949	
Butter and cheese,	508,968	
Pork, (pickled,) bacon, lard, live hogs,	2,120,020	
Horses and mules,	212,696	
Sheep,	29,061	
		$3,963,694
Vegetable food—		
Wheat,	264,109	
Flour,	3,763,073	
Indian corn,	281,749	
Indian meal,	454,166	
Rye meal,	65,631	
Rye, oats, and other small grain and pulse,	108,640	
Biscuit or ship bread,	312,232	
Potatoes,	47,757	
Apples,	32,825	
Rice,	1,625,726	
		6,955,908
Tobacco,		4,650,979
Cotton,		49,119,806
All other agricultural products—		
Flaxseed,	49,406	
Hops,	123,745	
Brown sugar,	3,435	
Indigo,	198	
		176,784
MANUFACTURES.		
Soap and tallow candles,	407,105	
Leather, boots, and shoes,	115,355	
Household furniture,	197,982	
Coaches and other carriages,	48,036	
Hats,	39,843	
Saddlery,	17,653	
Wax,	137,532	
Spirits from grain,	21,395	
Beer, ale, porter, and cider,	44,064	
Snuff and tobacco,	278,319	
Lead,	492,765	
Linseed oil and spirits of turpentine,	29,434	
Cordage,	22,198	
Iron—pig, bar, and nail,	120,923	
castings,	41,189	
all manufactures of	370,581	
Spirits from molasses,	117,537	
Sugar, refined,	47,345	
Chocolate,	2,032	

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Gunpowder,	$47,088	
Copper and brass,	79,234	
Medicinal drugs,	108,438	
		$2,786,048
Cotton piece goods—		
Printed and colored,	$358,415	
White,	2,275,049	
Twist, yarn, and thread,	57,312	
All other manufactures of,	232,774	
		3,223,550
Flax and hemp—bags and all manufactures of,	326	
Wearing apparel,	28,845	
Combs and buttons,	23,227	
Brushes,	4,467	
Billiard tables and apparatus,	415	
Umbrellas and parasols,	4,654	
Leather and morocco skins not sold per pound,	26,782	
Printing presses and type,	20,530	
Musical instruments,	6,684	
Books and maps,	23,643	
Paper and stationery,	51,391	
Paints and varnish,	28,994	
Vinegar,	7,555	
Earthen and stone ware,	2,907	
Manufactures of glass,	25,348	
tin,	5,026	
pewter and lead,	7,121	
marble and stone,	8,545	
gold and silver, and gold leaf,	1,905	
Gold and silver coin,	107,429	
Artificial flowers and jewelry,	3,769	
Molasses,	1,317	
Trunks,	2,072	
Bricks and lime,	3,883	
Domestic salt,	10,262	
		3,630,647
Articles not enumerated—		
Manufactured,	470,261	
Other articles,	575,199	
		1,045,460
		$77,793,783

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2. FOREIGN PRODUCE.

Summary statement of the principal articles of the growth, produce, and manufacture of foreign countries, exported from the United States, commencing on the 1st day of October, 1842, and ending on the 30th day of June, 1843.

MERCHANDISE FREE OF DUTY.		Quantity.	Value.
Anatomical preparations,			$ 161
Barilla,			1,001
Wood, dye,			188,473
other,			22,784
Hides and skins,			7,528
Tin, in pigs and bars,			25
in plates and sheets,			557
Bullion, gold,			450
Specie, gold,			299,808
silver,			1,113,104
Copper, in pigs and bars,			88,592
in plates and sheets,			79,452
old, fit only for remanufacture,			56,837
Teas,	pounds	1,080,389	443,601
Coffee,	do.	6,378,994	422,860
Worsted stuff goods,			491
Linens,			3,786
MERCHANDISE PAYING DUTIES AD VALOREM.			
Manufactures of wool—			
Cloths and cassimeres,			24,979
Blankets, not above 75 cents each,			108
Hosiery, gloves, mitts, and bindings,			977
Worsted stuffs,			22,820
All other,			3,118
Manufactures of cotton—			
Dyed, printed, and coloured,			251,809
White,			33,998
Twist, yarn, or thread,			15,028
Hosiery, gloves, mitts, and bindings,			4,881
All other manufactures of, not specified,			2,901
Silks—			
Bolting cloths,			742
Hosiery,			513
Manufactures of, not specified,			12,793
Silk and worsted goods,			4,929
Lace, thread, and insertings,			893
Cotton quillings, insertings, bobbinets, &c.			5,424
Manufactures of flax—			
Linens, bleached and unbleached,			154,402
Other manufactures of,			3,479

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MERCHANDISE PAYING DUTIES AD VALOREM.

	Quantity.	Value.
Manufactures of hemp—		
Sheeting, brown and white,		$40,662
Ticklenburgs, osnaburgs, and burlaps,		27,072
Other manufactures of,		4,427
Clothing, ready made,		4,192
articles of, not specified, worn by men, women, or children,		54
Wire, brass or copper,		1,500
Manufactures of iron and iron and steel—		
Fire arms, not specified,		2,71[illegible]
Side arms,		112
Drawing and cutting knives,		924
Needles, sewing, knitting, and tambouring,		495
All other manufactures of,		20,448
Manufactures of brass,		496
tin,		1,179
leather,		2,854
Glass—plate glass, if framed,		210
manufactures of, not specified,		164
Wood, cabinet ware,		1,437
other manufactures of		22,256
Wares—		
China and porcelain,		373
Earthen and stone,		25,965
Plated and gilt,		5,776
Japanned,		1,172
Clocks,		535
Watches and parts of watches,		13,193
Gold and silver, manufactures of,		2,202
Buttons, all other buttons and button moulds,		500
Articles imported from other places than their growth or production—		
Coffee, pounds,	58,000	2,534
Wood, unmanufactured—mahogany,		38,706
Wool, unmanufactured, not exceeding 7 cents per pound, pounds		655
exceeding 7 cents per pound, do.	114,993	33,996

MERCHANDISE PAYING SPECIFIC DUTIES.

Silks—		
Sewing silk, silk twist, or twist of silk and mohair, pounds	26	190
Manufactures of silk, not specified, do.	20,723	192,539
Raw silk, compreding all silk in the gum, &c. do.	1,299	3,353
Flannels, sq. yds.	14,039	9,504
Sail duck, do.	75,348	22,160
Cotton bagging, do.	62,594	8,174

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MERCHANDISE PAYING SPECIFIC DUTIES.

		Quantity.	Value.
Cotton bagging of other materials than hemp or flax,	sq. yds.	22,171	$3,284
Oil cloth—furniture oil cloth, not specified,	do.	144	43
Beer, ale, and porter, in bottles,	gallons	1,122	1,172
in casks,	do.	7,800	2,200
Vinegar,	do.	3,224	848
Molasses,	pounds	1,168,396	18,510
Sugar, brown,	do.	1,536,476	69,717
white,	do.	192,800	12,274
loaf, and other refined,	do.	157,700	11,168
Ginger, ground,	do.	540	108
Cheese,	do.	5,586	506
Hard soap,	do.	5,709	400
Beef and pork,	do.	532,375	11,993
Saltpetre, refined,	do.	73,434	3,683
Glue,	do.	400	86
Tobacco, manufactured—			
Snuff,	do.	366	62
Cigars,	do.	51,764	59,154
Cotton, manufactured,	do.	6,780,941	354,168
Hemp, unmanufactured,	cwt	500	2,012
Manilla, sun, and other hemps of India, &c.	do.	80	472
Jute, Sisal grass, coir, &c., used as hemp for cordage, &c.	do.	280	1,198
Copper nails and spikes,	pounds	500	116
Lead, old and scrap,	do.	15,000	525
Pins, solid-headed, in packs of 5,000 each,	packs	1,349	1,253
pound pins,	pounds	864	338
Fire arms, muskets,	No	3,079	8,922
Manufactures of iron—			
Wrought nails,	pounds	5,473	715
Spikes, cut or wrought,	do.	500	68
Chain cables and parts,	do.	15,325	708
Chains, other than cables,	do.	2,914	183
Castings, all other,	do.	15,480	436
Sad irons, hatters' and tailors' irons,	do.	5,630	227
Round or square iron, as braziers' rods, from 3-16 to 10-16 inch,	do.	4,093	491
Sheet iron, except taggers',	do.	18,144	769
Hoop iron,	do.	5,981	152
Band-iron, scroll iron, or casement rods, slit, rolled, or hammered,	do.	8,330	417
Pig,	cwt	600	570
Bar, manufactured by rolling,	do.	2,413	7,986
otherwise,	do.	1,311	4,473

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MERCHANDISE PAYING SPECIFIC DUTIES.

		Quantity.	Value.
Steel, other than shear, cast, and German,	cwt	4,975	$59,733
Paper—			
Folio and quarto post,	pounds	142	70
Medium, demy, and foolscap, pot and pith,	do.	63,302	9,119
Sheathing, wrapping, and cartridge,	do.	6,796	501
Blank books, bound,	do.	6	1
Books printed in other languages than Hebrew, Greek, Latin, or English, bound or in boards,	volumes	1,180	2,270
Books printed in English, unbound,	pounds	250	78
Salt,	bushels	37,032	10,236
Coal,	tons	8,557	34,414
Breadstuffs, wheat,	bushels	919	892
Fish, salmon,	barrels	3	41
all other,	do.	100	375
Total value of merchandise paying specific duties			1,567,315
Total value of merchandise paying duties ad valorem,			1,889,257
Total value of merchandise free of duty,			3,096,125
Total value,			$6,552,697

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PRODUCTS OF THE UNITED STATES, (1843)

(As officially estimated by the Commissioner of Patents, in his Annual Report, January 31, 1844.)

State or Territory.	Population in 1840.	Present estimated population.	Wheat.	Barley.	Oats.	Rye.	Buckwheat.	Indian corn.
			Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Maine	501,973	542,145	785,484	273,554	1,138,007	159,672	62,568	1,390,799
New Hampshire	284,574	288,170	534,762	111,643	1,470,663	378,299	140,180	330,925
Massachusetts	737,699	786,815	190,726	134,655	1,468,361	600,239	107,583	2,347,451
Rhode Island	108,830	113,483	3,376	51,959	190,303	44,617	3,845	578,720
Connecticut	309,978	314,902	94,622	26,495	1,424,444	934,234	387,463	1,526,458
Vermont	291,948	295,862	620,695	46,250	2,721,374	278,709	229,053	1,252,853
New York	2,428,921	2,643,095	12,479,499	1,802,962	24,907,553	3,677,222	2,398,354	15,574,590
New Jersey	373,306	394,298	971,727	9,733	3,286,438	2,335,987	682,235	5,805,121
Pennsylvania	1,724,033	1,874,353	12,215,230	150,398	19,836,938	9,429,637	2,408,508	15,857,431
Delaware	78,085	78,417	333,197	4,508	862,819	42,486	11,560	2,739,982
Maryland	470,019	479,197	3,391,535	3,246	2,817,200	779,836	94,046	6,205,288
Virginia	1,239,797	1,251,153	9,004,359	89,317	12,879,878	1,249,329	390,635	45,836,788
North Carolina	753,419	759,591	2,237,661	3,808	4,858,989	243,218	21,378	27,916,077
South Carolina	594,398	800,182	1,326,974	3,686	1,744,198	56,848	–	18,190,913
Georgia	691,392	841,580	2,463,771	12,346	1,586,797	75,578	588	26,960,687
Alabama	590,756	703,236	906,909	7,942	1,736,038	68,442	72	24,817,069
Mississippi	375,651	511,263	429,384	1,894	983,228	15,492	94	9,386,399
Louisiana	352,411	407,723	–	–	196,583	2,193	–	8,957,382
Tennessee	829,210	888,130	6,317,254	4,567	9,224,653	381,164	22,620	67,838,477
Kentucky	779,828	816,592	4,674,845	14,601	9,918,881	2,106,469	11,618	59,355,156
Ohio	1,519,467	1,756,091	18,786,705	181,833	16,313,403	934,440	659,695	38,651,128
Indiana	685,866	822,598	7,225,566	28,862	9,268,337	199,755	61,115	36,677,171
Illinois	476,183	692,653	4,829,182	84,033	8,639,931	124,237	79,396	32,760,434
Missouri	383,102	481,598	1,089,777	9,583	3,643,933	71,709	16,815	27,148,608
Arkansas	97,574	124,446	2,986,705	878	344,717	9,465	140	8,754,204
Michigan	212,267	284,395	5,296,271	143,757	3,210,716	64,195	167,212	3,592,482
Florida	54,477	62,373	686	50	14,919	361	–	838,667
Wiskonsan	30,945	49,521	606,740	16,394	833,247	3,689	20,455	750,775
Iowa	43,112	69,478	495,611	1,505	474,856	7,360	11,906	2,128,416
District of Columbia	43,712	50,944	11,583	319	13,862	5,479	346	47,837
	17,069,453	19,183,583	100,310,856	3,220,721	145,929,966	24,290,271	7,959,410	494,618,306

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PRODUCTS OF THE UNITED STATES, (1843).

(As officially estimated by the Commissioner of Patents, in his Annual Report, January 31, 1844.)

State or Territory.	Potatoes.	Hay.	Flax and Hemp.	Tobacco.	Cotton.	Rice.	Silk.	Sugar.	Wine.
	Bushels.	*Tons.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Gallons.*
Maine	10,253,531	1,000,923	3,874	78	-	-	680	151,458	2,292
New Hampshire	6,191,071	547,842	23,379	277	-	-	880	102,497	391
Massachusetts	4,179,251	829,987	882	28,891	-	-	30,153	282,648	200
Rhode Island	902,387	54,300	92½	481	-	-	912	30	795
Connecticut	2,622,295	602,906	4,248	601,262	-	-	140,971	21,220	1,083
Vermont	8,209,571	1,100,737	29½	742	-	-	7,194	3,075,447	109
New York	26,553,612	4,295,536	1,947	1,082	-	-	5,228	6,924,616	5,564
New Jersey	2,426,457	350,452	1,235	2,840	-	-	4,166	39	9,396
Pennsylvania	9,161,469	1,899,128	3,527	441,944	-	-	96,482	878,730	18,983
Delaware	257,911	20,338	65	281	-	-	3,586	-	273
Maryland	908,330	106,270	615½	20,776,769	7,677	-	6,829	-	7,124
Virginia	3,132,243	466,482	31,728	41,918,040	3,353,756	3,084	6,180	938,457	13,045
North Carolina	4,517,863	141,436	13,569	14,548,795	46,934,276	3,394,666	6,443	5,376	27,347
South Carolina	3,918,405	29,864	-	58,254	55,219,697	66,892,807	5,546	16,962	672
Georgia	2,408,623	20,731	14	130,201	185,758,138	14,019,250	6,124	224,395	8,961
Alabama	1,749,057	20,136	7½	248,177	112,020,112	166,581	5,743	7,082	355
Mississippi	2,814,929	877	25¾	146,855	162,664,359	953,654	223	87	17
Louisiana	1,311,760	32,390	-	111,057	128,912,953	2,990,490	1,045	97,173,590	2,691
Tennessee	1,864,636	59,516	4,399	29,325,868	32,938,410	8,700	20,072	368,903	696
Kentucky	1,246,469	136,926	9,508	52,322,543	737,684	17,062	4,732	1,957,858	1,838
Ohio	6,462,248	1,407,510	12,664	5,991,296	-	-	25,902	5,856,558	14,507
Indiana	2,858,746	1,621,606	12,150	2,899,844	168	-	840	5,892,405	11,432
Illinois	3,867,661	280,383	2,879	965,260	214,007	732	3,400	412,363	794
Missouri	1,213,984	74,966	30,300	14,700,069	149,889	-	210	317,376	34
Arkansas	534,260	880	1,977	216,508	11,520,467	6,612	217	2,111	
Michigan	4,465,871	223,827	1,280	2,187	-	-	1,395	1,307,629	
Florida	373,806	1,561	3	155,509	7,229,206	566,107	415	249,322	
Wiskonsan	710,607	61,965	4	425	-	-	28	162,034	
Iowa	390,765	28,599	654	13,271	-	-	-	55,899	
District of Columbia	52,435	1,733	-	61,715	-	-	1,038		
	105,756,133	15,419,807	161,007¾	185,731,554	747,660,090	89,879,145	315,965	126,400,310	139,240

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COMMERCE AND NAVIGATION OF THE UNITED STATES;

For the three quarters commencing October 1, 1842, and ending June 30, 1843.

(*From the Annual Report of the Secretary of the Treasury, April* 8, 1844.)

GENERAL VIEW OF EXPORTS, IMPORTS, AND TONNAGE OF VESSELS.

	COUNTRIES.	COMMERCE.				NAVIGATION.			
		VALUE OF EXPORTS.			Value of imports.	AMERICAN TONNAGE.		FOREIGN TONNAGE.	
		Domestic produce.	Foreign produce.	Total.		Entered the United States.	Cleared from the United States.	Entered the United States.	Cleared from the United States.
1	Russia	$309,867	$76,926	$386,793	$742,803	8,213	4,163	271	271
2	Prussia	222,039	18,330	240,369	-	-	2,173	-	1,905
3	Sweden	18,381	15,807	34,188	227,356	816	780	4,781	488
4	Swedish West Indies	31,228	2,346	33,574	51,318	721	949		
5	Denmark	74,657	6,510	81,167	-	-	465	418	1,714
6	Danish West Indies	672,158	74,540	746,698	485,285	24,248	23,036	3,660	358
7	Holland	1,698,327	238,140	1,936,467	430,823	16,512	23,239	1,477	2,660
8	Dutch East Indies	90,239	103,742	193,981	121,524	701	2,890		
9	Dutch West Indies	204,937	10,819	215,756	230,571	7,801	3,794	124	248
10	Dutch Guiana	24,680	-	24,680	32,533	3,540	3,066		
11	Belgium	1,674,224	296,485	1,970,709	171,695	11,580	20,708	2,081	8,529
12	Hanse Towns	2,898,948	392,984	3,291,932	920,865	7,090	13,937	34,600	42,075
13	Hanover	-	-	-	-	-	-	1,377	-
14	England	37,149,095	1,106,064	38,255,159	26,141,118	273,622	329,935	166,360	163,174
15	Scotland	2,363,354	14,657	2,378,011	128,846	10,041	12,764	14,473	18,848
16	Ireland	208,502	1,180	209,682	43,535	221	982	12,581	2,197
17	Gibraltar	218,251	38,197	256,448	23,915	1,942	6,941	308	1,568
18	Malta	6,436	11,471	17,907	27	378	214		
19	British East Indies	237,576	140,136	377,712	689,777	5,661	5,415		
20	Australia	57,805	11,232	69,037	44,910	299	590		
21	Cape of Good Hope	30,055	-	30,055	31,192	-	406		
22	British African ports	-	-	-	-	415	125	446	279
23	British West Indies	2,332,309	25,671	2,357,980	837,836	51,879	75,962	33,905	14,388
24	British Honduras	92,278	16,304	108,582	136,688	3,156	7,425	65	708
25	British Guiana	116,145	695	116,840	43,049	2,290	6,145	5,716	2,094
26	British American colonies	2,617,005	107,417	2,724,422	857,696	209,808	202,607	214,112	233,092
27	Other British colonies	-	-	-	-	363	92		
28	France on the Atlantic	10,384,578	441,578	10,826,156	7,050,537	95,566	110,171	8,629	11,171
29	France on the Mediterranean	1,186,294	83,701	1,269,995	609,149	11,322	18,167	275	418

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30	Bourbon	29,245	-	29,245	-	-	562		
31	French West Indies	281,828	13,108	294,936	135,921	13,874	24,006	6,417	103
32	French Guiana	45,374	-	45,374	40,411	1,172	737		
33	Miquelon and French fisheries	5,215	-	5,215	119	216	1,329	-	226
34	French African ports	1,532	-	1,532	-	-	284	-	362
35	Hayti	610,796	42,574	653,370	898,447	16,468	16,606	807	717
36	Spain on the Atlantic	50,100	240	50,340	49,029	10,636	2,298	1,843	302
37	Spain on the Mediterranean	-	-	-	415,069	6,636	479	1,010	
38	Teneriffe and other Canaries	7,099	3,925	11,024	15,058	300	486	211	
39	Manilla and Philippine Islands	57,743	54,435	112,178	409,290	4,615	1,401		
40	Cuba	2,926,922	399,875	3,326,797	5,015,933	117,847	136,238	7,069	4,897
41	Other Spanish West Indies	442,034	11,321	453,355	1,076,125	33,245	18,361	171	340
42	Portugal	59,096	1,538	60,634	46,713	6,240	2,557	2,414	543
43	Madeira	37,649	3,856	41,505	7,160	493	1,657		
44	Fayal and other Azores	8,569	621	9,190	12,783	1,257	742	345	
45	Cape de Verd Islands	52,327	4,978	57,205	4,713	335	1,302	-	167
46	Italy	541,500	186,721	728,221	394,564	3,143	3,350	527	1,117
47	Sicily	32,558	51,871	84,429	169,664	10,588	565	1,544	680
48	Sardinia	108,091	-	108,091	-	1,705	1,951	954	260
49	Trieste	460,240	118,938	579,178	72,957	5,239	8,679	-	1,782
50	Turkey	108,465	68,014	176,479	182,854	2,853	1,533		
51	Morocco, &c.	-	-	-	-	1,622	-	375	
52	Texas	105,240	37,713	142,953	445,309	16,927	16,185	165	927
53	Mexico	907,745	564,192	1,471,937	2,782,406	23,896	22,727	1,606	2,360
54	Central America	34,469	18,497	52,966	132,167	1,896	1,802		
55	Venezuela	483,077	100,425	583,502	1,191,280	9,991	8,030	1,176	884
56	New Granada	72,009	89,944	161,953	115,733	1,096	1,245	260	
57	Brazil	1,568,584	223,704	1,792,288	2,947,658	39,466	32,066	2,179	1,395
58	Argentine Republic	168,083	94,026	262,109	793,488	6,836	2,144	200	
59	Cisplatine Republic	219,576	75,549	295,125	121,753	2,755	6,858		393
60	Chili	869,883	179,580	1,049 463	857,556	3,186	5,318		
61	Peru	-	-	-	135,563	277	446		
62	South America generally	98,713	-	98,713	-	-	755		
63	China	1,755,393	663,565	2,418,958	4,385,566	13,460	13,532		
64	Europe generally	36,066	140	36,206					
65	Asia generally	253,861	267,296	521,157	445,637	823	4,513		
66	Africa generally	281,060	22,189	303,249	353,274	4,613	3,960	490	140
67	West Indies generally	95,412	125	95,537	-	149	15,038		169
68	Atlantic Ocean	-	-	-	-	5,543	3,897		
69	South Seas	58,961	18,805	77,766	45,845	32,396	96,549		
70	Sandwich Islands	-	-	-	-	1,290	593		
71	Uncertain places	-	-	-	623				
	Total	$77,793,783	$6,552,697	$84,346,480	$64,753,799	1,143,523	1,968,083	534,752	523,949

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II. IMPORTS.

A summary statement of the quantity and value of the principal articles imported into the United States, during the nine months ending the 30th June, 1843.

FREE OF DUTY.	Quantity.	Value.
Articles imported for the use of the United States,		$1,447
Models and inventions of machinery,		597
Anatomical preparations,		1,869
Specimens of botany,		8,906
Animals for breed,		14,262
Wood, dye, in sticks,		226,675
unmanufactured, not specified,		21,522
Gypsum, or plaster of Paris,		58,154
Pewter, old,		630
Brass, in pigs and bars,		133,859
old, fit only for remanufacture,		1,106
Copper, in pigs and bars,		369,076
in sheets and plates, suited to the sheathing of ships,		244,050
ore,		64,148
old, fit only for remanufacture,		47,641
coin,		70,224
Bullion, gold,		100,835
silver,		142,199
Specie, gold,		16,965,602
silver,		5,111,699
Teas, pounds	13,866,137	3,849,228
Coffee, do.	92,295,660	6,346,787
Tin, in pigs, bars, and blocks, under 25th section of act 1842,		25,304
Hides and skins, do. do. do.		291,744
Indigo, do. do. pounds	8,480	7,326
Wool, not exceeding 8 cts. per lb., under 25th section of act 1842, pounds	51,059	3,632
Total,		$35,574,584

PAYING DUTIES AD VALOREM.	
Manufactures of wool—	
Cloths and cassimeres,	1,356,628
Merino shawls of wool,	41,436
Blankets not exceeding 75 cts. each,	29,996
exceeding 75 cts. each,	171,458
Hosiery, gloves, mitts, caps, and bindings,	61,073
Worsted stuff goods,	456,051

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PAYING DUTIES AD VALOREM.	Quantity.	Value.
Worsted yarn,		60,961
Coach lace,		975
All other manufactures of wool,		74,317
Manufactures of cotton—		
Dyed, printed, or coloured,		1,739,318
White or uncoloured,		393,105
Velvets, cords, moleskins, fustian, &c.		93,926
Twist, yarn, and thread,		26,227
Hosiery, gloves, mitts, caps, and bindings,		307,243
All other manufactures of cotton,		398,977
Silks—		
Floss and other dyed,		10,247
Shirts and drawers,		1,442
Umbrellas, parasols, and sun shades,		24
Imported under the 25th section of the act of 1842.		
Silks—		
Piece goods, under 25th section of act 1842,		238,809
Sewing silk, do. do. do.		2,521
Bolting cloths,		7,037
Manufactures of silk, not specified,		442,065
Silk and worsted goods,		318,685
Camlets and other manufactures of goats' hair or mohair,		5,438
Manufactures of flax—		
Linens, bleached and unbleached,		1,202,772
Hosiery, gloves, mitts, caps, and bindings,		51
Other manufactures of flax,		282,098
Manufactures of hemp—		
Sheetings, brown and white,		83,503
Ticklenburgs, osnaburgs, and burlaps,		58,699
Other manufactures of hemp,		41,842
Lace—		
Thread and insertings,		42,535
Cotton quillings, insertings, bobbinet, &c.		209,168
Gold, and tassels, tresses, knots, stars, &c.		13,925
Embroidery in gold and silver,		28
Clothing, ready made,		60,591
articles not specified, partly finished,		114,493
embroidered with gold or silver,		17
Grass cloth,		440
carpeting, not specified,		8,162
Chinese mattings or flags, &c.		27,489
mats and matting, not specified,		712
Wire, silvered or plated,		198
brass or copper,		159

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PAYING DUTIES AD VALOREM.	Quantity.	Value.
Manufactures of iron and steel—		
Fire arms, not specified,		$25,736
Side arms,		1,879
Drawing and cutting knives,		763
Hatchets, axes, and adzes,		1,149
Socket chisels		1,663
Steel yards and scale beams,		285
Vices,		3,731
Sickles and reaping hooks,		833
Scythes,		6,547
Spades and shovels,		3,222
Squares,		47
Screws, other than wood screws,		256
Needles, sewing, knitting, &c.		7,345
All other manufactures of iron and steel,		681,281
Saddlery, common, tinned, and japanned,		11,288
plated, brass, and polished steel,		27,097
Manufactures of—		
Brass,		38,454
Copper,		25,170
Tin,		4,493
Pewter,		1,908
German silver,		140
Bronze,		33
Leather,		24,230
Glass—		
Plate glass, exceeding 14 by 22 inches,		14,492
Silvered,		33,224
Framed,		4,385
Paintings on glass, porcelain, and coloured,		499
Manufactures of glass, not specified,		8,991
Wood—		
Cabinet ware,		8,199
Other manufactures of wood,		53,080
Wares—		
China and porcelain,		53,985
Earthen and stone,		534,051
Plated and gilt,		30,687
Japanned,		8,400
Furs—		
Undressed, on the skin,		77,116
Hats, caps, muffs, and tippets,		6,249
Hatters' and other furs, not specified,		87,702
Copper bottoms, cut round, &c.		765
Zinc, in plates and sheets,		37,747
Chronometers, ship or box,		1,005
Clocks,		6,620

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IMPORTS OF THE UNITED STATES.

PAYING DUTIES AD VALOREM.		Quantity.	Value.
Watches and parts of watches,			$261,038
Manufactures of gold and silver,			24,034
Jewelry, gold and silver,			29,060
imitations of jewelry,			11,585
Quicksilver,			35,114
Buttons and moulds			4,053
Teas, imported from places other than that of their growth or production,	pounds	3,229	634
Coffee, imported from places other than that of its growth or production,	pounds	618,897	52,402
Wood, unmanufactured—			
Mahogany,			98,512
Rose,			182
Satin,			82
Cedar,			43
Tin, in pigs and bars,			82,164
in plates and sheets,			577,731
Hides and skins,			2,328,071
Wool, not exceeding 7 cents per pound,	pounds	3,332,654	190,352
exceeding 7 cents per pound	do.	184,446	54,695
ARTICLES PAYING SPECIFIC DUTIES.			
Silks—			
Sewing silk, silk twist, or twist of silk and mohair,	do.	39,139	196,709
Pongees and plain white silk, for printing, &c.	do.	8,688	32,193
Manufactures of silk, not specified,	do.	215,038	1,719,616
Raw silk, and all silk in the gum, &c.	do.	17,898	53,350
Flannels,	sq. yds	35,596	17,779
Baizes,	do.	58,018	19,670
Carpeting—			
Wilton,	do.	7,372	17,099
Saxony,	do.	603	1,141
Treble ingrained,	do.	1,606	1,190
Brussels,	do.	117,243	151,948
Venetian,	do.	9,298	6,131
Other ingrained,	do.	6,646	4,301
Sail duck,	do.	771,064	236,965
Molasses,	pounds	129,536,523	1,134,820
Vinegar,	gallons	14,903	2,206
Beer, ale, and porter, in casks,	do.	6,206	2,981
Beer, ale, and porter, in bottles,	do.	68,492	63,123
Spirits of turpentine,	do.	3	2
Sugar—			
Brown,	pounds	69,534,331	2,426,011
White clayed,	do.	1,098,025	64,932
Loaf and other refined,	do.	699,090	41,279
Candy,	do.	3.919	339

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ARTICLES PAYING SPECIFIC DUTIES.		Quantity.	Value.
Syrup of sugar cane,	pounds	3,685	$ 57
Candles—			
Wax and spermaceti,	do.	1,419	473
Tallow,	do.	1,451	348
Cheese,	do.	30,033	3,850
Soap—			
Hard,	do.	16,531	1,279
Soft,	do.	1	4
Tallow,	do.	11,873	897
Starch,	do.	31,694	1,526
Pearl barley,	do.	1,921	57
Butter,	do.	4,552	568
Beef and pork,	do.	359,801	5,984
Hams and bacon,	do.	26,815	2,731
Glue,	do.	8,420	823
Gunpowder,	do.	120	39
Tobacco, manufactured—			
Snuff,	do.	505	239
Cigars,	do.	378,988	463,431
All other,	do.	2,109	476
Cotton, unmanufactured,	do.	7,658,132	386,790
Hemp, unmanufactured,	cwt.	36,269	228,882
Manilla, sun, and other hemps of India, &c.	do.	11,329	42,149
Jute, Sisal grass, coir, &c., used as hemp for cordage,	do.	11,287	37,164
Codilla or tow of hemp or flax,	do.	22,787	81,913
Flax, unmanufactured,	do.	1,219	15,193
Rags of all kinds,	pounds	2,106,751	79,853
Hat bodies, or felts, made in whole or in part of wool,	No.	228	95
Copper nails and spikes,	pounds	64	12
Patent sheathing metal,	do.	1,787	276
Lead—			
Pigs and bars,	do.	290	3
Shot,	do.	100	20
Old and scrap,	do.	12,979	190
In sheets and forms not specified,	do.	35	14
Brass battery, or hammered kettles,	do.	6,212	1,724
Brass screws,	do.	11	7
Pins—			
Solid-headed, in packs of 5,000 each,	packs	6,442	4,850
Pound pins,	pounds	8,142	2,720
Fire arms—			
Muskets,	No.	447	1,035
Rifles,	do.	17	370
Cap or bonnet wire, covered with silk,	pounds	523	366
with other materials,	do.	388	175

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ARTICLES PAYING SPECIFIC DUTIES.

		Quantity.	Value.
Iron and steel wire—			
Not above No. 14, ...	do.	48,059	$3,818
Above No. 14, and not above No. 25, ...	do.	6,161	1,771
Above No. 25, ...	do.	1,748	565
Tacks, brads, and sprigs—			
Not above 16 ounces per M...	M.	1,434	158
Above 16 ounces per M.....	pounds	1,215	186
Manufactures of iron—			
Wood screws, ...	pounds	40,260	7,551
Cut nails, ...	do.	7,965	549
Wrought nails, ...	do.	141,508	12,711
Spikes, cut or wrought, ...	do.	6,247	227
Chain cables and parts,.....	do.	775,320	24,196
Chain, other than cables, ...	do.	108,939	4,662
Malleable irons or castings,..	do.	19,058	3,235
Mill saws, cross cut and pit saws,.....	do.	225	846
Steam, gas, or water tubes or pipes, ...	do.	39,400	2,710
Anchors, in parts, ...	do.	52,839	2,944
Anvils, ...	do.	266,452	15,153
Blacksmiths' hammers and sledges,.....	do.	19,307	1,177
Castings, vessels of, ...	do.	209,076	6,911
all other, ...	do.	447,708	9,005
Glazed or tin hollow ware,...	do.	136,963	11,197
Sad irons, hatters' and tailors' irons,.....	do.	28,474	1,275
Cast iron butts or hinges, ...	do.	312,789	19,043
Axletrees, or parts thereof,...	do.	8,681	441
Round or square iron, as braziers' rods, from 3-16ths to to 10-16ths inch, ...	do.	878,415	11,005
Nail or spike rods, slit, rolled, or hammered,.....	do.	11,902	515
Sheet iron, except taggers' ..	do.	2,504,886	132,322
Hoop iron, ...	do.	103,662	1,884
Band iron, scroll iron, casement rods, slit, rolled, or hammered, ...	do.	26,408	1,292
Pig iron, ...	cwt.	77,461	48,251
Old and scrap, ...	do.	3,157	2,743
Bar, manufactured by rolling,.	do.	315,157	511,282
Bar, manufactured otherwise,.	do.	125,081	327,550
Steel—			
Cast, shear, and German, ...	do.	14,334	185,907
All other, ...	do.	2,290	15,865
Leather—			
Tanned, sole, or bend leather,.	do.	4,900	546

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ARTICLES PAYING SPECIFIC DUTIES.

		Quantity.	Value.
Upper leather, not otherwise specified,	do.	280	$109
Calf skins, tanned and dressed,	dozen	1,452	19,238
Sheep skins, tanned and dressed,	do.	2,095	12,598
Skivers,	do.	748	4,539
Goat skins, tanned and dressed,	do.	185	1,655
Morocco skins, tanned and dressed,	do.	146	1,534
Kid skins, tanned and dressed,	do.	264	1,338
Goat and sheep skins, tanned and not dressed,	do.	198	599
Kid and lamb skins, tanned and not dressed,	do.	725	1,478
Fawn, kid, and lamb, known as chamois,	do.	6	10
Paper—			
Folio and quarto post,	pound	7,950	3,201
Antiquarian and drawing,	do.	3,025	961
Medium, demy, and foolscap, pot and pith,	do.	11,458	1,767
All other writing,	do.	400	191
Copperplate, blotting, and copying,	do.	9,407	4,946
Coloured, for labels and needles,	do.	260	53
Marble and fancy coloured,	do.	410	317
Tissue,	do.	855	234
Coloured copperplate, printers' and stainers',	do.	896	545
Binders' boards, box boards, mill boards, &c.	do.	301	12
Sheathing, wrapping, and cartridge,	do.	11,197	717
Playing cards, blank and visiting,	do.	87	32
All other paper,	do.	3,924	1,484
Books—			
Blank books, bound,	do.	738	310
unbound,	do.	298	169
Printed in Latin, or Greek, bound,	do.	724	813
unbound,	do.	1,785	1,497
Printed in Hebrew, Greek, Latin, or English, 40 years before importation,	volumes	6,675	3,234
Printed in Hebrew, bound,	pounds	1,214	561
unbound,	do.	242	170
Printed in other languages than Hebrew, Greek, Latin,			

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ARTICLES PAYING SPECIFIC DUTIES.		Quantity.	Value.
or English, bound or in boards,	volumes	38,438	$25,029
In sheets or pamphlets,	pounds	1,759	1,159
Printed in English, bound,	do.	6,120	9,742
unbound,	do.	42,724	41,338
Printed and published one year before importation, and not republished in the United States, or five years before importation, bound,	do.	1,679	1,753
unbound,	do.	5,880	6,214
Reports of legislative committees, &c.	volumes	188	206
Polyglots, lexicons, and dictionaries,	pounds	1,056	1,376
Salt,	bushels	5,454,577	710,489
Coal,	tons	41,163	116,312
Coke or culm,	do.	1,800	69
Breadstuffs—			
Wheat,	bushels	12,080	8,401
Barley,	do.	1,701	106
Rye,	do.	9	8
Oats,	do.	1,155	361
Indian corn,	do.	6	3
Wheat flour,	cwt.	56	141
Potatoes,	bushels	28,192	11,417
Fish—			
Dried or smoked,	cwt.	188	1,411
Salmon,	barrels	2,640	26,993
Mackerel,	do.	12,334	57,457
Herrings,	do.	399	2,048
All other,	do.	1,391	3,704

Value of merchandise paying specific duties,	$12,494,340
Value of merchandise paying ad valorem duties,	16,684,875
Value of merchandise free of duty,	35,574,584
Total,	$64,753,799

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Statement of the Commerce of each State and Territory, commencing on the 1st of October, 1842, and ending on the 30th of June, 1843.

	STATES AND TERRITORIES.	VALUE OF EXPORTS.							VALUE OF IMPORTS.		
		DOMESTIC PRODUCE.			FOREIGN PRODUCE.			Total of domestic and foreign produce.	In American vessels.	In Foreign vessels.	Total.
		In American vessels.	In Foreign vessels.	Total.	In American vessels.	In Foreign vessels.	Total.				
1	Maine	$656,835	$23,577	$680,432	$161	$2,298	$2,459	$682,891	$197,673	$52,587	$250,260
2	New Hampshire	43,061	1,598	44,659	75	40	115	44,774	5,836	2,453	8,289
3	Vermont	141,834	-	141,834	28,137	-	28,137	169,971	38,000	-	38,000
4	Massachusetts	4,128,830	301,851	4,430,681	1,620,310	354,216	1,974,526	6,405,207	8,066,249	8,723,203	16,789,452
5	Rhode Island	105,292	-	105,292	555	-	555	105,847	155,611	147	155,758
6	Connecticut	306,950	273	307,223	-	-	-	307,223	229,112	1,729	230,841
7	New York	11,093,244	2,349,990	13,443,234	2,393,458	925,972	3,319,430	16,762,664	27,360,920	3,995,620	31,356,540
8	New Jersey	8,033	-	8,033	2,588	-	2,588	10,621			
9	Pennsylvania	1,948,644	123,301	2,071,945	275,065	7,998	283,003	2,354,948	2,630,521	130,109	2,760,630
10	Delaware	94,362	4,128	98,490	192	-	192	98,682	1,752	2,933	4,685
11	Maryland	2,152,593	667,621	2,820,214	176,705	18,637	195,342	3,015,556	2,179,119	300,013	2,479,132
12	Dist. of Columbia	183,451	101,312	284,763	-	185	185	284,948	62,075	33,367	95,442
13	Virginia	1,810,915	143,595	1,954,510	2,637	18	2,655	1,957,165	155,681	31,381	187,062
14	North Carolina	168,535	2,564	171,099	-	-	-	171,099	108,739	2,237	110,976
15	South Carolina	5,034,953	2,719,199	7,754,152	2,249	4,408	6,657	7,760,809	1,084,653	210,056	1,294,709
16	Georgia	2,791,968	1,730,433	4,522,401	-	-	-	4,522,401	146,316	61,116	207,432
17	Alabama	7,022,248	4,135,212	11,157,460	-	-	-	11,157,460	239,068	121,587	360,655
18	Mississippi										
19	Louisiana	21,516,337	5,137,587	26,653,924	443,511	292,989	736,500	27,390,424	7,156,961	1,013,054	8,170,015
20	Ohio	10,956	109,152	120,108	-	-	-	120,108	9,454	1,320	10,774
21	Kentucky	-	-	-	-	-	-	-	8,145	-	8,145
22	Tennessee										
23	Michigan	262,994	-	262,994	-	-	-	262,994	76,175	195	76,370
24	Missouri										
25	Florida	625,764	134,571	760,335	174	179	353	760,688	59,815	98,817	158,632
	Total	60,107,819	17,685,964	77,793,783	4,945,817	1,606,880	6,552,697	84,346,480	49,971,875	14,781,924	64,753,799

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TONNAGE ENTERED THE UNITED STATES.

	STATES AND TERRITORIES.	AMERICAN VESSELS.				FOREIGN VESSELS.				TOTAL AMERICAN AND FOREIGN VESSELS.			
		No.	Tons.	Crews.		No.	Tons.	Crews.		No.	Tons.	Crews.	
				Men.	Boys.			Men.	Boys.			Men.	Boys.
1	Maine	149	27,197	1,093	56	497	36,490	1,994	46	646	63,687	3,087	102
2	New Hampshire	8	2,093	76	7	50	2,230	110	-	58	4,323	186	7
3	Vermont	99	15,538	450	144	-	-	-	-	99	15,538	450	144
4	Massachusetts	685	150,309	7,517	266	568	47,840	2,120	-	1,253	198,149	10,637	266
5	Rhode Island	55	11,726	656	7	3	498	27	-	58	12,224	683	7
6	Connecticut	70	15,956	907	12	17	1,964	97	-	87	17,920	1,004	12
7	New York	1,808	418,524	20,650	1,102	992	177,984	12,424	82	2,800	596,508	33,074	1,184
8	New Jersey												
9	Pennsylvania	221	42,419	1,835	147	34	5,525	256	55	255	47,944	2,091	202
10	Delaware	2	221	14	-	2	233	13	-	4	454	27	
11	Maryland	187	37,134	1,608	-	68	14,464	705	-	255	51,598	2,313	
12	Dist. of Columbia	24	4,559	212	2	19	2,521	136	6	43	7,080	348	8
13	Virginia	75	16,271	663	-	16	2,915	148	-	91	19,186	811	
14	North Carolina	156	19,722	972	14	11	1,471	76	-	167	21,193	1,048	14
15	South Carolina	172	39,628	1,697	73	116	41,055	1,502	262	288	80,683	3,199	335
16	Georgia	63	18,919	742	-	78	43,017	1,576	-	141	61,936	2,319	
17	Alabama	138	48,592	1,831	-	96	56,648	1,962	-	234	105,540	3,793	
18	Mississippi												
19	Louisiana	839	261,802	9,909	-	233	90,450	3,754	-	1,072	352,252	13,663	
20	Ohio	18	1,514	72		46	5,060	250	-	64	6,574	322	
21	Kentucky												
22	Tennessee												
23	Michigan	2	63	5	-	21	1,892	75	-	23	1,955	80	
24	Missouri								-				
25	Florida	101	11,636	774	-	22	2,495	230	-	123	14,131	1,004	
	Total	4,872	1,143,523	51,684	1,830	2,889	534,752	28,455	451	7,761	1,678,275	80,139	2,281

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TONNAGE ENTERED THE UNITED STATES.

	STATES AND TERRITORIES.	AMERICAN VESSELS.				FOREIGN VESSELS.				TOTAL AMERICAN AND FOREIGN VESSELS.			
		No.	Tons.	Crews.		No.	Tons.	Crews.		No.	Tons.	Crews.	
				Men.	Boys.			Men.	Boys.			Men.	Boys.
1	Maine	329	60,453	2,418	169	494	35,974	1,963	45	823	96,427	4,381	214
2	New Hampshire	5	1,018	47	12	51	2,256	111	-	56	3,274	158	12
3	Vermont	93	15,359	441	144	-	-	-	-	93	15,359	441	144
4	Massachusetts	669	138,295	7,242	96	566	49,253	3,192	-	1,235	187,548	10,434	96
5	Rhode Island	43	7,645	470	7	-	-	-	-	43	7,645	470	7
6	Connecticut	67	14,113	868	52	19	2,743	129	-	86	16,856	997	52
7	New York	1,684	384,281	18,839	1,106	961	174,374	12,279	84	2,645	558,655	31,118	1,190
8	New Jersey	1	130	7	-	-	-	-	-	1	130	7	
9	Pennsylvania	241	41,573	1,909	174	34	5,899	268	51	275	47,472	2,177	225
10	Delaware	13	1,949	96	3	3	366	19	-	16	2,315	115	3
11	Maryland	222	41,473	1,930	-	70	15,431	745	-	292	56,904	2,675	
12	Dist. of Columbia	34	5,242	241	6	19	3,001	156	6	53	8,243	397	12
13	Virginia	168	34,943	1,483	-	21	4,353	219	-	189	39,296	1,702	
14	North Carolina	233	30,411	1,475	7	11	1,292	73	-	244	31,703	1,548	7
15	South Carolina	261	71,400	2,797	129	123	43,191	1,577	232	384	114,591	4,374	361
16	Georgia	131	43,055	1,633	-	76	42,033	1,462	-	207	85,088	3,095	
17	Alabama	200	79,107	2,904	-	96	55,900	1,988	-	296	135,007	4,892	
18	Mississippi												
19	Louisiana	808	292,473	10,887	-	220	80,697	3,317	-	1,028	373,170	14,204	
20	Ohio	15	1,245	61	-	47	5,170	258	-	62	6,415	319	
21	Kentucky												
22	Tennessee												
23	Michigan	5	439	20	-	17	1,507	59	-	22	1,946	79	
24	Missouri								-				
25	Florida	68	3,479	374	-	20	509	161	-	88	3,988	535	
	Total	5,290	1,268,083	56,142	1,905	2,848	523,949	27,976	418	8,138	1,792,032	84,118	2,323

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FOREIGN TONNAGE WHICH ENTERED INTO AND CLEARED FROM THE UNITED STATES,

From 1st October, 1842, to 30th June, 1843, specified according to its national character.

	FLAG.	FOREIGN VESSELS								
		ENTERED.				CLEARED.				
		No.	Tons.	Crews.		No.	Tons.	Crews.		
				Men.	Boys.			Men.	Boys.	
1	British,	2,614	453,894	24,870	406	2,568	441,535	24,283	381	1
2	Hanoverian,	8	2,050	77		3	756	25		2
3	French,	39	13,582	580	13	36	12,384	533	9	3
4	Spanish,	38	7,249	424		38	6,981	413		4
5	Hanseatic,	105	38,202	1,591	16	106	38,277	1,573	20	5
6	Russian,	3	695	35		2	521	22		6
7	Prussian,	8	1,916	80		7	1,646	69		7
8	Belgian,	2	611	31		4	2,743	167		8
9	Swedish,	31	9,444	379	4	27	8,143	322	4	9
10	Norwegian,	4	1,124	47		9	2,560	100		10
11	Danish,	12	2,190	93	12	18	3,619	160	4	11
12	Dutch,	3	511	25		4	637	35		12
13	Italian,	1	255	17		1	255	17		13
14	Sardinian,	2	443	26		1	260	15		14
15	Sicilian,	4	920	56		5	1,266	75		15
16	Texan,	2	51	6		3	374	22		16
17	Mexican,	1	124	7		1	140	9		17
18	Colombian,	3	304	26		2	248	20		18
19	Venezuelan,	9	1,187	85		10	1,181	91		19
20	New Granadian,					2	302	17		20
21	Brazilian,					1	121	8		21
	Total,	2,889	534,752	28,455	451	2,848	523,949	27,976	418	

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Statement of the number and class of vessels built, and the tonnage thereof, in each State and Territory of the United States, for the three quarters ending on the 30th June, 1843.

STATES.	CLASS OF VESSELS.					Total number of vessels built.	TOTAL TONNAGE.
	Ships.	Brigs.	Schooners.	Sloops and canal boats.	Steamboats.		Tons. 95ths.
Maine	25	21	25			71	15,120 90
New Hampshire			1	1		2	233 76
Massachusetts	20	2	15	3		40	9,974 01
Rhode Island			1			1	119 80
Connecticut		1	1	6	4	12	1,063 80
New York	5	2	9	103	5	124	13,298 68
New Jersey			9	8	2	19	1,480 01
Pennsylvania	3	3	2	35	20	63	6,739 72
Delaware		1	1		1	3	245 63
Maryland	4	1	33		1	39	3,678 91
District of Columbia				11		11	276 13
Virginia	1		5	2	1	9	693 77
North Carolina		3	18			21	2,000 19
South Carolina				1	1	2	206 13
Georgia			1			1	45 09
Ohio			6		25	31	5,194 69
Tennessee					2	2	322 27
Kentucky					11	11	1,664 18
Alabama			1	1		2	144 24
Michigan			4	1		5	304 89
Mississippi			6	1	1	8	288 05
Florida					5	5	522 42
Total	58	34	138	173	79	482	63,617 77

Comparative Statement of the Imports and Exports of the District of New York, during the first six months of the year 1843, and the first six months of the year 1844.

(From an official statement from the New York Custom House, July 16, 1844.)

Imports.	1843.	1844.
Paying duty,	$12,886,411	$32,023,702
Free,	11,944,264	6,656,260
Total,	24,830,675	38,679,962
Duties,	$4,646,271	$11,421,597
Exports.		
Domestic goods,	8,650,672	14,676,724
Foreign goods,	2,185,885	2,442,310
Total,	$10,836,557	$17,119,034

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TARIFF.

A Comparative Statement of the most important articles bearing Specific Duties, as imposed by the Acts of 1816, 1824, 1828, 1832, *and* 1842, *respectively.*

Names of Articles.		Duties by the several Acts of				
		1816.	1824.	1828.	1832.	1842.
Flannels, bockings, and baizes	sq. yd.	25 p. c.	25 p. c.	14	16	14 cts.
Carpeting, Brussels, &c.	"	25 p. c.	50	70	63	50
Carpeting, Venetian, &c.	"	25 p. c.	25	40	35	30
Carpeting, floor-cloth, patent	"	30 p. c.	30 p. c.	50	43	35
Oil-cloth, furniture	"	15 p. c.	30 p. c.	25	12½	10
Cotton bagging	"	20 p. c.	3½	5	3½	4
Vinegar	per gall.	15 p. c.	8	8	8	5
Beer in casks	"	10	15	15	15	15
Beer in bottles	"	15	20	20	20	20
Oil, fish, &c.	"					15
Oil, olive	"	25	25	25	25	20
Oil, castor	"	15	40	40	40	40
Oil, linseed and rapeseed	"	15	25	25	25	25
Sugar, brown	per lb.	3	3	3	2½	2½
Sugar, white-clayed	"	4	4	4	3½	3
Sugar, loaf	"	12	12	12	12	6
Sugar, candy	"	12	12	12	12	4
Sugar, lump and other refined	"	10	10	10	10	6
Sugar syrup	"	15 p. c.	15 p. c	15 p. c.	2½	5
Chocolate	"	3	4	4	4	4
Cheese	"	9	9	9	9	9
Tallow candles	"	3	5	5	5	4
Lard	"	15 p. c.	3	3	3	3
Beef and Pork	"	15 p. c.	2	2	2	2
Bacon	"	15 p. c.	3	3	3	3
Butter	"	15 p. c.	5	5	5	5
Saltpetre, refined	"	7½	3	3	3	2
Oil of vitriol	"	7½	3	3	3	1
Dry Ochre	"	1	1	1	1	1
Ochre in oil	"	1½	1½	1½	1½	1½
Red and White Lead	"	3	4	5	5	4
Whiting	"	1	1	1	1	1½
Litharge	"	15 p. c.	15 p. c.	5	5	4
Sugar of Lead	"	15 p. c.	15 p. c.	5	5	4
Lead, pig, &c.	"	1	2	3	3	3
Lead Pipes	"	20 p. c.	25 p. c.	5	5	4
Lead, old scrap	"	15 p. c.	15 p. c.	15 p. c.	2	1½
Cordage, tarred	"	3	4	4	4	4½
Cordage, untarred	"	4	5	5	5	5
Twine, Packthread, &c.	"	4	5	5	5	6
Corks	"	15 p. c.	12	12	12	30 p. c
Copper rods, bolts, nails and spikes	"	4	4	4	4	4 cts.
Wire, cap or bonnet	"	30 p. c.	30 p. c.	30 p. c.	12	12
Wire, iron and steel, not above No. 14	"			6	5	5
Wire, iron and steel, above No. 14	"			10	9	8 to 11
Iron nails	"	3	5	5	5	3
Iron Spikes	"	2	4	4	4	2½
Iron Cables and Chains and Parts	"	20 p. c.	3	3	3	2½
Iron Anchors	"	1½ p. c.	2	2	2	2½
Iron Anvils	"	20 p. c.	2	2	2	2½
Iron, blacksmiths' hammers, &c.	"	20 p. c.	2½	2½	2½	2½
Iron Castings, Vessels, &c.	"	20 p. c.	1½	1½	1½	2½
Iron, all other Castings	"	20 p. c.	1	1	1	1
Iron, round and braziers' rods, 3-16 to 10-16 diameter.	"	20 p. c.	3	3½	3	2½
Iron, nail or spike rods	"	20 p. c.	3	3½	3	2½
Iron, sheet or hoop	"	2½ p. c.	3	3½	3	2½
Iron, band, &c.	"	20 p. c.	3	3½	530	2½ cts.
Iron in Pigs	per cwt.	50	62½	50		45
Iron, old scrap	"			62½	62½	50
Iron, bar, rolled	"	150	150	185	150	112½
Iron, bar, hammered	"	45	90	112	90	85
Hemp	"	150	175	300	200	200
Alum	"	100	200	250	250	150
Copperas	"	100	200	200	200	200

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TARIFF.

Names of Articles.	Duties by the several Acts of				
	1816.	1824.	1828.	1832.	1842.
Wheat Flour.....per cwt.	15 p. c.	50	50	50	70
Salt.....per bushel.	20	20	20	10	8
Coal..... "	5	6	6	6	$1.75 p. t.
Wheat..... "	15 p. c.	25	25	25	25 cts.
Oats and Potatoes..... "	15 p. c.	10	10	10	10
Paper, folio and quarto post.....per lb.	30 p. c.	20	20	20	17
Paper, foolscap, &c..... "	30 p. c.	17	17	17	15
Paper, printing, copperplate..... "	30 p. c.	10	10	10	10½
Paper, sheathing, &c..... "	30 p. c.	3	3	3	3
Paper, all other..... "	30 p. c.	15	15	15	15
Books, prior to 1775—other than Eng. pr. vol.		4	4	4	4
Books, Greek and Latin, bound,.....per lb.		15	15	15	15
Books, Greek and Latin, unbound.... "		13	13	13	13
Books, all other, bound,..... "		30	30	30	30
Books, all other, unbound..... "		26	26	26	26
Wind. Glass, not over 8 by 10, per 100 sqr. ft.	250	300	300	300	200
Window Glass, over 8 by 10, and not over 10 by 12.....100 sq. ft.	275	350	350	350	350
Window Glass, over 10 by 12..... "	275	4 to 500	4 to 500	400	600
Fish, dried or smoked.....per quintal.	100	100	100	100	100
Fish, Salmon.....per bbl.	200	200	200	200	200
Fish, Mackerel, or Herring..... "	150	150	150	150	150
Fish, all other..... "	100	100	100	100	100
Shoes and Slippers, silk.....per pair.	30	30	30	30	25
Shoes, prunella..... "	25	25	25	25	25
Shoes, leather, &c..... "	25	25	25	25	30
Shoes, children's..... "	15	15	15	15	15
Boots and Bootees..... "	150	150	150	150	125
Wool, costing over 8 cents.....per lb.	Over 10	30 p. c.	50 p. c.	40 p. c.	23 p. c.
	Under 10	15 p. c.	& 4 cs.	& 4 cts.	& 4 cts.
*Wool, costing over 7 cents per lb..... "					30 p. c. & 3 cts.
" costing under 7 cents per lb... "					5 p. c.
Woollen Yarn..... "	25	33⅓		50 p. c. & 4 cs.	30 p. c. & 3 cts.
Merino Shawls.....per ct.	25	33⅓ and 45 p. c. on various minima.		50	40 cts.
Cloths and Cassimeres..... "	25			50	40
Other Woollen Manufactures..... "	25			50	40
Clothes, ready made,..... "	30	30	50	50	50
Glass, cut.....per lb.	20 p. c.	30 p. c. & 3 c.	30 p. c. & 3 cts.	30 p. c. & 3 cs.	25
Glass, plain and other..... "				20 p. c. & 2 cs.	to 42
Wool manufactures.....per ct.				50	40
Silk and Worsted goods..... "				10	30
Lace Thread..... "				15	15
Lace Cotton..... "				12½	20
Cotton manufactures, minimum..... "				25	20
Cotton manufactures, duty..... "				25	30
Cotton, twist, minimum 60 cts lb.....per lb.				25	25
Sewing Silk, &c..... "				40 p. c.	$2.00 lb.
Sheetings, brown and white.....per ct.				25	25
Flax.....per ton.				free	$2.00
Flax, Linens.....per ct.				15	25
Silk manufacture.....per ct.				5 p. c.	$2.50 lb.
Spirits, 1st and 2d proof.....per gall.				60	60
Spirits, 3d proof..... "				63	65
Spirits, 4th proof..... "				67	70
Spirits, 5th proof..... "				75	75
Spirits, over proof..... "				90	90
Wine, Madeira..... "				50	60
Wine, Sherry..... "				50	60
Wine, Port..... "				50	60

* The variation of the duties on Wool cannot be expressed in the above table, owing to changes in the grade. By the Tariff of 1824, all Wool costing over ten cents per pound paid 30 per cent. on its valuation; all costing under 10 c. pr. lb. paid 15 per ct. By the Tariff of 1828, all Wool costing over eight cents per lb. was taxed 4 cents per lb. and 50 per cent. ad valorem; which rates, by the Tariff of 1832, was reduced to 4 c. per lb. and 40 per ct. while all Wool costing less than eight cents per lb. was admitted *free*. By the present Tariff, all Wool pays 3 cents per lb. and 30 per cent. ad valorem except such as costs, when cleaned, less than seven cents pr. lb. and this is taxed 5 per cent.

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FINANCES OF THE UNITED STATES.

I. DEBT

[From the Annual Report of the Secretary of the Treasury, December 6, 1843.]

Statement of the debt of the United States, December 1, 1843.

1. Of the (old) funded debt, being unclaimed principal and interest returned from the late loan offices..		$208,009 34
2. Outstanding certificates and interest to December 31, 1798, of the (old) unfunded debt, payable on presentation.....		24,214 29
3. Treasury notes issued during the late war, payable on presentation		4,317 44
4. Certificates of the Mississippi stock, payable on presentation		4,320 09
5. Debts of the corporate cities of the district of Columbia, assumed by the United States, viz:		
Of the city of Washington.....	$900,000 00	
Alexandria.....	210,000 00	
Georgetown	210,000 00	
		1,320,000 00
6. Loans, viz:		
Under the act of July 21, 1841, redeemable January 1, 1845, ...	5,672,976 88	
Under the act of April 15, 1842, redeemable January 1, 1863 ..	8,343,856 03	
Under the act of March 3, 1843,. redeemable July 1, 1853,.....	7,000,000 00	
		21,016,862 91
7. Outstanding treasury notes:		
Of the several issues prior to August 31, 1843	*3,917,725 92	
Of notes issued and paid out under the act of March 3, 1843	247,500 00	
		4,165,225 92†

* This sum includes $98,300 in the hands of the accounting officers.

† TREASURY NOTES OUTSTANDING, JULY 1, 1844.

Amount outstanding per the records of this office, viz:		
Of notes issued under acts passed prior to the 3d March, 1843		$950,887 31
Of notes issued and paid out under the act of 3d March, 1843	$1,806,950	
Deduct amount redeemed of this issue	501,550	
		1,305,400 00
		2,256,207 31
Deduct cancelled notes in the hands of the accounting officers		47,850 00
		$2,208,357 31

TREASURY DEPARTMENT, *Register's Office*, July 1, 1844.

T. L. SMITH, *Register of the Treasury.*

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II. REVENUE AND EXPENDITURE, FROM JANUARY 1, 1842, TO OCTOBER 1, 1843.

[From the Annual Report of the Secretary of the Treasury, December 6, 1843.]

Receipts, Expenditures, &c., of 1842.

According to the settlement of the Treasurer's account on the 1st day of January, 1842, there was in the treasury, ...			$28,685,111 08
From which is to be deducted as not available—			
Amount deposited with the States	$28,101,644 91		
Balances of trust-funds 1st of January, 1842, ...	374,521 18		
		28,476,166 09	
The outstanding warrants at the close of the year 1841, were.....		813,268 46	
Total liabilities.....		$29,289,434 55	
Deficiency of means to meet warrants			604,323 47
			$29,289,434 55

Instead of any available balance in the treasury on the 1st of January, 1842, there was, therefore, a deficiency to meet the outstanding warrants of.....$604,323 47

From the acccompanying statement, (A,)* it appears that the receipts into the treasury during the year 1842, exclusive of trust-funds and of the avails of treasury notes and loans, were $19,643,966 40

The expenditures of the same year, exclusive of the sums paid on the redemption of treasury notes, and

*(A,) STATEMENT OF DUTIES, REVENUES, AND PUBLIC EXPENDITURES, DURING THE CALENDAR YEAR 1842, AGREEABLY TO WARRANTS ISSUED, EXCLUSIVE OF TRUST-FUNDS.

The receipts into the treasury during the year 1842, were as follows:

From customs, viz—				
During the first quarter		$1,840,721 15		
During the second quarter		6,138,390 62		
During the third quarter, ...		6,981,659 18		
During the fourth quarter		3,927,137 81		
				$18,187,908 76
From sales of public lands.....				1,335,797 52
From miscellaneous and incidental sources				120,260 12
Total receipts, exclusive of loans and treasury notes .				19,643,966 40
Avails of treasury notes issued under act of Feb. 15.	1841	1,060,206 05		
Avails of treasury notes issued under act of January 31,	1842	7,915,644 83		
Avails of treasury notes issued under act of August 31,	1842	2,408,554 89		
Avails of loans of 1841 and 1842.....		3,425,329 87		
				14,809,735 64
Total means				34,453,702 04
The expenditures for the year 1842, exclusive of trust-funds, were, viz—				
Navy Department, ...		8,324,983 70		
Public Debt,.....		8,477,868 94		
Total expenditures.....		$32,398,986 54		

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interest on them, and on recent loans, and on account of the old public debt, were	$23,921,037 60
The excess of expenditures over revenue was	4,277,071 20
The amount paid on account of the old public debt, treasury notes, and interest on them and on loans, was	8,477,868 94
To supply the deficiency in the revenue, and to provide means for the redemption of treasury notes, others were issued, and loans obtained to the amount of	14,808,735 64
And a balance was thus left in the treasury, on the 1st of January, 1843, (exclusive of deposites with the States, indemnities, and trust-funds, and deducting outstanding warrants,) subject to appropriation, of	1,449,472 03

Receipts, Expenditures, &c. of the first six months., 1843.

The balance in the treasury on the 1st January, 1843, exclusive of deposites with States, trust-funds, and outstanding warrants, was	$1,449,472 03
By the accompanying statement (B,)* it appears that the receipts between the 1st of January and 1st of July, 1843, exclusive of the avails of treasury notes and loans, were	$8,065,325 46
And the expenditures, exclusive of the sums paid on account of the public debt, were	10,698,390 83
Excess of expenditure over revenue	$2,633,065 37
The amount paid for redemption of treasury notes, and for principal and interest on the public debt, was	861,607 47

*(B.) STATEMENT OF DUTIES, REVENUE, AND PUBLIC EXPENDITURES, BETWEEN JANUARY 1 AND JUNE 30, 1843, AGREEABLY TO WARRANTS ISSUED DURING SAID PERIOD EXCLUSIVE OF TRUST-FUNDS

The receipts into the treasury from January 1 to June 30, 1843, were as follows:		
From customs, viz—		
During the first quarter	$2,940,804 16	
During the second quarter	4,106,039 75	
		$7,046,843 91
From sales of public lands		897,818 11
From miscellaneous and incidental sources		120,663 44
Total receipts, exclusive of loans and treasury notes		8,065,325 46
Avails of treasury notes issued under act of January 31, 1842	45,350 00	
Avails of treasury notes issued under act of August 31, 1842	617,000 00	
Avails of loans of 1841 and 1842	4,883,358 36	
Avails of loan of March, 3, 1843	6,934,000 00	
		12,479,708 36
Total means		20,545,033 82
The expenditures from January 1 to June 30, 1843, exclusive of trust-funds, were, viz—		
Civil List	1,196,931 07	
Foreign intercourse	204,393 13	
Miscellaneous	1,465,964 53	
War Department	4,158,384 31	
Navy Department	3,672,717 79	
Public Debt	861,607 47	
Total expenditures	$11,559,998 30	

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To supply the deficiency, and to provide means for the redemption of treasury notes, others were issued, and loans obtained to the amount of	$5,545,708 36
And a loan was made, under the act of March 3, 1843, of $7,000,000, of which nearly the whole was received during the quarter	6,934,000 00
Which left a balance, on the 1st of July, 1843, of	10,434,507 55

This large apparent balance arises from the circumstance that, while nearly the whole proceeds of the seven-million loan were paid in during the half year, the amount of notes redeemed by those proceeds does not appear in the accounts of that period, but is contained in those of the next quarter.

The real balance, excluding the loan and the notes subsequently redeemed, was about $3,370,000 00

Revised estimate of the receipts and expenditures for the fiscal year commencing July 1, 1843.

The accounts of the first quarter of the present fiscal year—that is, from July 1st, to September 30th, 1843—exhibit the following results:

RECEIPTS.

From customs	$6,132,272 09
Sales of public lands	388,870 22
Miscellaneous and incidental	26,871 43
Total revenue received	6,548,013 74
Residue of subscription to loan of seven millions	66,000 00
Total	6,614,013 74
Balance in the treasury, July 1, 1843, ...	10,434,507 55
Total means	$17,048,521 29

EXPENDITURES.

Civil, miscellaneous, and foreign intercourse, ...	$1,016,257 17
Army proper, ...	858,785 15
Fortifications, ordnance, arming militia, &c.....	610,400 90
Indian department	880,171 88
Pensions	806,800 04
Naval establishment.....	2,049,387 36
Interest, &c., public debt.....	95,555 48
Total, exclusive of redemption of treasury notes and interest	6,317,357 98
Paid on redemption of treasury notes and interest	6,902,031 54
Total payments for the quarter, ...	13,219,389 52
Leaving a balance on the 1st of October, 1843, of	3,829,131 77

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III. FINANCES OF THE UNITED STATES,

For the last quarter of the fiscal year of 1843–4, *viz., from April* 1 *to June* 30, 1844, *inclusive. Published by the Secretary of the Treasury, in compliance with a late Act of Congress. This statement is an approximation.*

1. RECEIPTS.

From Customs,		$8,471,000 00
" Lands,		500,500 00
" Miscellaneous sources,		50,000 00
" Treasury notes per act 1843,		25,000 00
		$9,046,500 00

2. PAYMENTS.

On account of civil, miscellaneous, and foreign intercourse,		$1,280,778 69
On account of Army, including miscellaneous,	$1,216,978 20	
On account of Indian Department,	95,249 44	
On account of Fortifications,	145,752 41	
On account of Pensions,	234,998 75	
		1,692,978 80
On account of Navy,		1,300,481 25
On account of interest and public debt,		537,808 65
On account of reimbursements and interest on Treasury Notes,		1,063,983 24
		$5,876,030 63
Excess of receipts over payments,		$3,170,469 27

IV. APPROPRIATIONS

For the fiscal year commencing July 1, 1844, *and terminating June* 30, 1845.

CIVIL AND DIPLOMATIC.

Pay and Mileage of Congress,		$351,600 00
Officers and Clerks of both Houses,		29,010 50
Stationary, Fuel, Printing, &c.,		135,000 00
Library Expenses,		8,600 00
Salary of President,		25,000 00
Repairs, Salaries of Gardeners, &c. &c.		19,097 25
Department of State,		47,000 00

TREASURY DEPARTMENT.

Secretary of Treasury, Clerks, Messengers, &c.	$26,050	
First Comptroller's Office,	22,600	

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Second Comptroller's Office,		$15,250	
First Auditor's do. do.		18,900	
Second do. do.		20,900	
Third do. do.		35,050	
Fourth do. do.		18,950	
Fifth do. do.		12,800	
Treasurer, Clerks and Messengers,		13,750	
Register of Treasury Office,		27,200	
General Land Office,		98,500	
Solicitor's Office,		7,450	
Contingencies,		45,705	363,105 00
War Department,			121,505 00
Navy Department,			73,251 50
Patent Office,			4,300 00
Post Office Department,			85,570 00
Surveyors and their Clerks,			68,520 00
United States Mint and Branches,			133,020 00
Territories of the United States,			87,240 25
JUDICIARY.			
Chief Justice of Supreme Court and eight Assistant Judges,	$41,000 00		
District Judges,	52,900 00		
Other expenses of Judiciary,	437,519 67		
			530,419 67
INTERCOURSE WITH FOREIGN NATIONS.			
Ministers to Great Britain, France, Russia, Prussia, Austria, Spain, Mexico and Brazil,		$72,000	
Secretaries of Legation to the same places,		16,000	
Chargés d'Affaires to Portugal, Denmark, Sweden, Holland, Belgium, Chili, Peru, Venezuela, New Grenada, Texas, Naples, Sardinia and Buenos Ayres,		58,500	
Minister and Dragoman to Turkey,		8,500	
Intercourse with Barbary Powers,		10,000	
Contingent expenses of Foreign Intercourse, &c.		135,800	
			300,800 00
Fourth and Fifth volume Documentary History,			48,297 00
Purchase of United States Bank building in Philadelphia,			225,000 00
Miscellaneous,			9,178 74
Compensation of the several offices and employments under the act of August 26, 1842,			41,882 50
Employment of additional Clerks,			9,000 00
Deficiencies in 1844, &c.			212,870 82
ARMY.			
Pay of the Army,			$1,058,521 67
Commutation of Officers' subsistence,			284,597 77
Do. of Forage,			70,000 00

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Payment in lieu of clothing for discharged soldiers and officers' servants,	$34,877 57
Subsistence in kind,	226,316 80
Clothing, Camp and Garrison equipage,	140,000 00
Recruiting service,	27,364 70
Extra pay, and general supplies,	204,400 00
Incidental expenses of Quarter Masters' Department,	90,000 00
Expense of remounting 2d regiment of Dragoons, &c.	210,000 00
Barracks, Quarters, &c.	140,000 00
Transportation of Officers' baggage,	35,000 00
Do. of Troops and supplies,	170,000 00
Medical and Hospital Department,	27,800 00
Purchase of Ordnance and Stores,	75,000 00
Fortifications,	100,000 00
Surveys, &c.	47,000 00
Expenses of Ordnance Service,	95,000 00
Manufacture of Arms,	200,000 00
Arsenals,	100,000 00
Repairs and Miscellaneous,	112,334 59

NAVY.

Pay of officers, including Engineer's Corps,	$2,509,189 00
Navy Yards, Civil Establishment,	66,770 00
Superintendent of Naval Stores in foreign ports,	1,500 00
Provisions, &c.	615,828 00
Repairs and increase of Navy, Surgeon's necessaries, &c.	1,012,250 00
Ordnance and Ordnance Stores,	370,885 00
Books, Maps, Improvements, &c.	250,095 66
Contingent Expenses,	480,000 00
Marine Corps,	437,516 67

INDIAN DEPARTMENT.

Current and Contingent Expenses,	$50,000 00
Christian Indians,	26,400 00
Chippewas of the Mississippi,	35,000 00
Chippewas of Saganaw,	5,800 00
Chippewas, Menominies, Winnebagoes and New York Indians,	1,500 00
Chippewas, Ottowas and Pottawattomies,	33,790 00
Choctaws,	48,650 00
Creeks,	63,640 00
Chickasaws and Cherokees,	11,640 00
Chippewas of Lake Superior and Mississippi,	104,400 00
Delawares,	10,344 00
Florida, Iowas, Kickapoos,	14,375 00
Kansas and Omahas,	6,480 00
Miamies,	65,128 00
Eel Rives and Menomonies,	26,840 00
Ottawas and Chippewas,	60,065 00

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Ottoes and Missouri,	$6,640 00
Osages and Ottawas,	31,406 00
Pottawattomies (including those of the Huron,)	15,246 00
Pottawattomies of the Prairies and the Wabash,	35,4[illegible]0 00
Pottawattomies of Indiana and the Piankeshaws,	2,800 00
Pawnees, Seminoles, Sacs and Foxes,	63,500 00
Chippewas of Lake Superior and Mississippi,	25,477 00
Amount due Chippewas of Lake Superior,	2,640 72
Wyandot Nation (for improvements,)	50,000 00
Quapaws, Six Nations and Senecas,	15,160 00
Sioux of Mississippi,	40,510 00
Yancton and Santee Sioux, and Sacs and Foxes of Mo.	9,210 00
Sacs and Foxes of Mississippi,	85,540 00
Shawnees, and Senecas and Shawnees, &c.	31,808 39

FORTIFICATIONS.

Detroit,	$35,000
Port Ontario,	10,000
Governor's Island, (Boston)	40,427
Fort Warren, (Boston)	15,000
Rebuilding Fort Trumbull, New London)	20,000
Castle Williams, (New York)	8,000
Fort Hamilton, do.	8,000
Fort Delaware, (conditionally)	20,000
Fort Washington, (Portland)	15,000
Fort Calhoun,	5,000
Fort Caswell, (North Carolina)	6,500
Dike, &c. at Charleston,	20,000
Fort Johnson, (South Carolina,	1,500
Fort McRee, (Pensacola)	5,000
Fort Morgan, (Mobile)	12,000
Fort Jackson, (Louisiana)	5,000
Fort Smith, Public Buildings, (Arkansas)	30,000
Fort Towson; Public Buildings,	6,000
Buffalo,	20,000
Outlet in Lake Champlain,	40,000
Fort Independence, (Boston)	8,000
Fort Adams, (Newport)	8,000
Fort Schuyler, Throg's Point, (Long Island Sound)	30,000
Fort Wood, (Bedlow's Island)	13,000
Fort Mifflin,	4,900
Fort in Annapolis Harbour,	5,000
Fort Monroe, (Virginia)	15,000
Fort Macon, (North Carolina)	5,000
Fort Moultrie, (South Carolina)	10,000
Fort Sumpter, (South Carolina)	43,000
Fort Pulaski, (Savannah)	18,000
Fort Barrancas, (Pensacola)	12,500
Fort Pike, (Louisiana)	11,000
Fort Livingston, (Louisiana)	40,000

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Fort Gibson,		$15,000
Contingent, &c.		25,172
Total,		$550,999

A small portion of the above is for balances of former appropriations.

Total amount of appropriations for the fiscal year,		21,777,854 21
Deduct appropriations for the Post Office Department,	$4,530,000 00	
Appropriation of arrearage in the Naval Service,	532,000 62	
For American Seamen,	40,500 00	
		$5,102,500 62
		$16,675,353 59

V. LIST OF GENERAL DEPOSITE BANKS.

Commercial Bank, Portsmouth, New Hampshire.
Merchants' Bank, Boston, Massachusetts.
Arcade Bank, Providence, Rhode Island.
Farmers' and Mechanics' Bank, Hartford, Connecticut.
Bank of Commerce, New York.
Bank of America, New York.
Merchants' Bank, New York.
Philadelphia Bank, Philadelphia, Pennsylvania.
Exchange Bank, Pittsburg, Pennsylvania.
Merchants' Bank, Baltimore, Maryland.
Bank of Baltimore, Baltimore, Maryland.
Bank of the Metropolis, Washington, District of Columbia.
Southwestern Railroad Bank, Charleston, South Carolina.
Bank of Louisiana, New Orleans, Louisiana.
Ohio Life Insurance and Trust Company, Cincinnati, Ohio.
Clinton Bank of Columbus, Columbus, Ohio.
Bank of Norwalk, Norwalk, Ohio.
Michigan Insurance Company, Detroit, Michigan.
Bank of Sandusky, Sandusky, Ohio.

Banks in which Special Deposites are made.

American Exchange Bank, New York.
Bank of Washington, Washington, District of Columbia.
Bank of Potomac, Alexandria, District of Columbia.
Bank of Virginia, Richmond, Virginia.
Exchange Bank of Virginia, Norfolk, Virginia.
Planters' Bank of Georgia, Savannah, Georgia.
Bank of Mobile, Mobile, Alabama.
Union Bank of Tennessee, Nashville, Tennessee.
Bank of Missouri, St. Louis, Missouri.

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MINT OF THE UNITED STATES.

From the Annual Report of the Director, January 18, 1844.

DEPOSITES.

MINTS.	GOLD.						SILVER.				Total gold and silver.
	United States coins, old standard.	Foreign coins.	U. States bullion.	Foreign bullion.	Total.		Foreign coins.	Foreign bullion.	U. States bullion.	Total.	
Charlotte, North Carolina	-	-	$272,064	-	$272,064		-	-	-	-	$272,064
Dahlonega, Georgia	-	-	570,080	-	570,080		-	-	-	-	570,080
New Orleans	$1,257	$3,081,962	22,573	$33,198	3,138,990		$1,359,621	$24,699	-	$1,384,320	4,523,310
Philadelphia	26,994	3,548,632	180,728	351,453	4,107,807		2,110,198	247,992	$8,640	2,357,830	6,465,637
	28,251	6,630,394	1,045,445	384,651	8,088,941		3,460,819	272,691	8,640	3,742,150	11,831,091

COINAGE.

MINTS.	GOLD.				SILVER.						COPPER.		TOTAL.	
	Eagles.	Half eagles.	Quarter eagles.	Value.	Dollars.	Half dollars.	Quarter dollars.	Dimes.	Half dimes.	Value.	Cents.	Value.	Number.	Value.
	Pieces.	*Pieces.*	*Pieces.*	*Dollars.*	*Pieces.*	*Pieces.*	*Pieces.*	*Pieces.*	*Pieces.*	*Dollars.*	*Pieces.*	*Dollars.*	*Pieces.*	*Dollars.*
Charlotte, N. C.	-	44,353	26,096	287,005 00	-	-	-	-	-	-	-	-	70,409	287,005 00
Dahlonega, Geo.	-	98,452	36,209	582,782 50	-	-	-	-	-	-	-	-	134,661	582,782 50
New Orleans	175,162	101,075	368,002	3,177,000 00	-	2,268,000	968,000	150,000	-	1,391,000	-	-	4,030,239	4,568,000 00
Philadelphia	75,462	611,905	100,546	4,062,010 00	165,100	3,844,000	645,600	1,370,000	1,165,000	2,443,750	2,428,320	24,283 20	10,405,233	6,530,043 20
	250,624	855,085	530,853	8,108,797 50	165,000	6,112,000	1,613,600	1,520,000	1,165,000	3,834,750	2,428,320	24,283 20	14,640,582	11,967,830 70

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B.

Statement of the annual amounts of deposites of gold, for coinage, at the mint of the United States and its branches, from mines in the United States.

Periods.	Deposited at the United States mint.								Deposited at the branch mints.				Mint and branches.
	Virginia.	North Carolina.	South Carolina.	Georgia.	Tennessee.	Alabama.	Various sources.	Total at the U. States mint.	Branch mint at Charlotte, N. C.	Branch mint at Dahlonega, Geo.	Branch mint at New Orleans.	Total at the branch mints.	Total deposites of U. States gold.
1824	-	$5,000	-	-	-	-	-	$5,000	-	-	-	-	$5,000
1825	-	17,000	-	-	-	-	-	17,000	-	-	-	-	17,000
1826	-	20,000	-	-	-	-	-	20,000	-	-	-	-	20,000
1827	-	21,000	-	-	-	-	-	21,000	-	-	-	-	21,000
1828	-	46,000	-	-	-	-	-	46,000	-	-	-	-	46,000
1829	$2,500	134,000	$3,500	-	-	-	-	140,000	-	-	-	-	140,000
1830	24,000	204,000	26,000	$212,000	-	-	-	466,000	-	-	-	-	466,000
1831	26,000	294,000	22,000	176,000	$1,000	-	$1,000	520,000	-	-	-	-	520,000
1832	34,000	458,000	45,000	140,000	1,000	-	-	678,000	-	-	-	-	678,000
1833	104,000	475,000	66,000	216,000	7,000	-		868,000	-	-	-	-	868,000
1834	62,000	380,000	38,000	415,000	3,000	-	-	898,000	-	-	-	-	898,000
1835	60,400	263,500	42,400	319,900	100	-	12,200	698,500	-	-	-	-	698,500
1836	62,000	148,100	55,200	201,400	300	-	-	467,000	-	-	-	-	467,000
1837	52,100	116,900	29,400	83,600	-	-	-	282,000	-	-	-	-	282,000
1838	55,000	66,000	13,000	36,000	1,500	-	200	171,700	$127,000	$135,760	$700	$263,400	435,100
1839	57,660	53,500	6,300	20,300	300	$500	-	138,500	126,836	113,035	6,889	246,740	385,240
1840	38,995	36,804	5,319	91,113	104	4,431	-	176,766	124,796	121,858	2,835	249,419	426,185
1841	25,736	76,431	3,440	139,796	1,212	1,863	-	248,478	129,847	161,974	1,818	293,639	542,117
1842	42,163	61,699	223	150 276	-	5,579	13,717	273,587	174,508	323,372	5,630	503,510	777,097
1843	48,148	62,873	5,099	56,619	2,788	4,786	415	180,728	272,064	570,080	22,573	864,717	1,045,445
	694,642	2,939,737	360,881	2,258,004	18,304	17,159	27,539	6,316,159	954,981	1,496,019	40,425	2,421,425	8,737,684

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Coinage of the Mint of the United States in several years, including the coinage of the branch mints from the commencement of their operations, in 1838.

Years.	GOLD.	SILVER.	COPPER.	WHOLE COINAGE.	
	Value.	Value.	Value.	No. of pieces.	Value.
1793 } 1794 } 1795 }	$71,485 00	$370,683 80	$11,373 00	1,834,420	$453,541 80
1796	102,727 50	79,077 50	10,324 40	1,219,370	192,129 40
1797	103,422 50	12,591 45	9,510 34	1,095,165	125,524 29
1798	205,610 00	330,291 00	9,797 00	1,368,241	545,698 00
1799	213,285 00	423,515 00	9,106 68	1,365,681	645,906 68
1800	317,760 00	224,296 00	29,279 40	3,337,972	571,335 40
1801	422,570 00	74,758 00	13,628 37	1,571,390	510,956 37
1802	423,310 00	58,343 00	34,422 83	3,615,869	516,075 83
1803	258,377 30	87,118 00	25,203 63	2,780,830	370,698 53
1804	256,642 50	100,340 50	12,844 94	2,046,839	371,827 94
1805	170,367 50	149,388 50	13,483 48	2,260,361	333,239 48
1806	324,505 00	471,319 00	5,260 00	1,815,409	801,084 00
1807	437,405 00	597,448 75	9,652 21	2,731,345	1,044,595 96
1808	284,665 00	684,300 00	13,090 00	2,935,888	982,055 00
1809	169,375 00	707,376 00	8,001 53	2,861,834	884,752 53
1810	501,435 00	638,773 50	15,660 00	3,056,418	1,155,868 50
1811	497,905 00	608,340 00	2,495 95	1,649,570	1,108,740 95
1812	290,435 00	814,029 50	10,755 00	2,761,646	1,115,219 50
1813	477,140 00	620,951 50	4,180 00	1,755,331	1,102,271 50
1814	77,270 00	561,687 50	3,578 30	1,833,859	642,535 80
1815	3,175 00	17,308 00	.	69,867	20,483 00
1816	.	28,575 75	28,209 82	2,888,135	56,785 57
1817	.	607,783 50	39,484 00	5,163,967	647,267 50
1818	242,940 00	1,070,454 50	31,670 00	5,537,084	1,345,064 50
1819	258,615 00	1,140,000 00	26,710 00	5,074,723	1,425,325 00
1820	1,319,030 00	501,680 70	44,075 50	6,492,509	1,864,786 20
1821	189,325 00	825,762 45	3,890 00	3,139,249	1,018,977 45
1822	88,980 00	805,806 50	20,723 39	3,813,788	915,509 89
1823	72,425 00	895,550 00	.	2,166,485	967,975 00
1824	93,200 00	1,752,477 00	12,620 00	4,786,894	1,858,297 00
1825	156,385 00	1,564,583 00	14,926 00	5,178,760	1,735,894 00
1826	92,245 00	2,002,090 00	16,344 25	5,774,434	2,110,679 25
1827	131,565 00	2,869,200 00	23,577 32	9,097,845	3,024,342 32
1828	140,145 00	1,575,600 00	25,636 24	6,196,853	1,741,381 24
1829	295,717 50	1,994,578 00	16,580 00	7,674,501	2,306,875 50
1830	643,105 00	2,495,400 00	17,115 00	8,357,191	3,155,620 00
1831	714,270 00	3,175,600 00	33,603 60	11,792,284	3,923,473 60
1832	798,435 00	2,579,000 00	23,620 00	9,128,387	3,401,055 00
1833	978,550 00	2,759,000 00	28,160 00	10,307,790	3,765,710 00
1834	3,954,270 00	3,415,002 00	19,151 00	11,637,643	7,388,423 00
1835	2,186,175 00	3,443,003 00	39,489 00	15,996,342	5,668,667 00
1836	4,135,700 00	3,606,100 00	23,100 00	13,719,333	7,764,900 00
1837	1,148,305 00	2,096,010 00	55,583 00	13,010,721	3,299,898 00
1838	1,809,595 00	2,333,243 00	63,702 00	15,789,311	4,296,540 00
1839	1,355,885 00	2,189,296 00	31,286 61	11,811,594	3,576,467 61
1840	1,675,302 50	1,726,703 00	24,627 00	10,558,240	3,426,632 50
1841	1,091,597 50	1,132,750 00	15,973 67	8,811,968	2,240,321 17
1842	1,834,170 50	2,332,750 00	23,833 90	11,743,153	4,190,754 40
1843	8,108,797 50	3,834,750 00	24,283 20	14,640,582	11,967,830 70
	$39,125,688 00	$62,384,684 90	$979,620 96	284,248,071	$102,489,993 86

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PUBLIC LANDS OF THE UNITED STATES.

(From the Annual Report of the Commissioner of the General Land Office, December 14, 1843.)

A.

Statement of Public Lands sold; of cash, Treasurer's receipts, treasury notes, and scrip, received therefor; of incidental expenses thereon; and of payments into the treasury on account thereof, in the year 1842.

STATE OR TERRITORY.	Lands sold, after deducting erroneous entries.		Amount received in cash, Treasurer's receipts, and treasury notes.			Amount received in forfeited land stock and military scrip.		Amount of incidental expenses.	Amount paid into the treasury during the year.
	Acres.	Purchase money.	Cash.	Treasurer's receipts.	Treasury notes.	Forfeited land stock.	Military land scrip.		
Ohio	35,715.58	$47,380 75	$42,776 93	$2,690 00	-	$460 35	$1,543 47	$7,447 28	$57,325 36
Indiana	55,795.31	69,748 09	69,584 13	-	-	-	163 96	9,161 86	72,920 01
Illinois	437,404.20	546,834 93	462,168 54	2,053 00	$72,798 72	691 20	9,123 47	27,904 15	550,071 97
Missouri	158,330.86	197,633 72	196,424 64	200 00	304 11	-	704 97	11,848 18	198,401 62
Alabama	118,827.94	148,534 17	143,966 10	-	3,960 13	457 94	150 00	13,090 85	100,920 90
Mississippi	43,966.15	54,958 45	53,943 31	-	1,015 14	-	-	7,760 35	48,433 26
Louisiana	45,360.38	56,700 44	47,972 16	-	8,727 28	-	-	9,726 63	76,350 66
Michigan	25,000.16	31,250 21	31,098 63	-	151 58	-	-	5,321 31	22,337 83
Arkansas	24,391.29	30,489 18	29,082 67	-	406 51	-	1,000 00	6,811 11	20,964 16
Wiskonsan Territory	127,895.58	163,778 60	159,907 65	-	3,870 95	-	-	6,609 65	115,906 95
Iowa Territory	50,997.72	63,747 13	58,040 58	1,200 00	3,337 80	-	1,168 75	3,903 92	66,394 75
Florida Territory	5,533.11	6,916 20	4,595 59	-	2,020 80	-	300 00	1,777 46	5,050 90
Grand Total	1,129,917.58	$1,417,972 06	$1,299,561 93	$6,053 00	$96,593 02	$1,609 49	$14,154 62	$111,382 15	1,315,078 57
Paid by late receivers in Ohio, as above									718 95
									$1,335,797 52

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PUBLIC LANDS OF THE UNITED STATES.

(From the Annual Report of the Commissioner of the General Land Office, December 14, 1843.)

B.

Statement of Public Lands sold; of cash, Treasurer's receipts, treasury notes, and scrip, received therefor; of incidental expenses thereon; and of payments into the treasury on account thereof, in the first and second quarters of the year 1843.

STATE OR TERRITORY.	Lands sold, after deducting erroneous entries.		Amount received in cash, Treasurer's receipts, and treasury notes.			Amount received in forfeited land stock and military scrip.		Amount of incidental expenses.	Amount paid into the treasury during the first and second quarters of the year.
	Acres.	Purchase money.	Cash.	Treasurer's receipts.	Treasury notes.	Forfeited land stock.	Military land scrip.		
Ohio	5,764.99	$7,411 23	$7,342 48	-	-	-	$68 75	$1,802 26	$5,395 15
Indiana	15,672.19	19,650 97	18,789 31	-	-	$541 66	390 00	4,881 24	17,628 15
Illinois	193,900.34	242.379 88	230,060 91	$600 00	$9,279 30	-	2,439 58	14,181 88	258,463 49
Missouri	116,163.48	145,204 41	144,504 41	500 00	-	-	200 00	8,581 43	113,003 26
Alabama	152,697.58	190,961 31	186,044 55	-	3,527 36	1,989 40	100 00	12,405 47	143,617 20
Mississippi	23,762.22	29,711 50	29,297 50	-	414 00	-	-	4,056 39	39,318 55
Louisiana	26,873.77	33,592 16	27,396 52	400 00	5,865 64	-	-	4,036 45	29,299 50
Michigan	6,053.21	7,566 51	7,200 39	-	366 12	-	-	4,244 78	17,692 53
Arkansas	25,939.81	32,475 77	23,381 25	-	9,094 52	-	-	4,656 65	17,920 71
Wiskonsan Territory	57,186.21	72,781 17	72,490 00	-	291 17	-	-	4,247 74	120,534 08
Iowa Territory	99,042.41	123,803 00	120,929 80	-	2,673 20	-	200 00	5,326 10	128,656 56
Florida Territory	4,685.22	5,857 54	5,781 54	-	-	-	75 00	2,683 02	3,085 33
Grand Total	727,741 43	$911,394 45	$873,148 66	$1,500 00	$31,511 40	$1,831 06	$3,403 33	$61,103 53	$897,818 11

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PUBLIC LANDS OF THE UNITED STATES.

(From the Annual Report of the Commissioner of the General Land Office, December 14, 1843.)

C.1

Statement of Public Lands sold; of cash, Treasurer's receipts, treasury notes, and scrip, received therefor; of incidental expenses thereon; and of payments into the treasury on account thereof, in the third quarter of the year 1843.

STATE OR TERRITORY.	Lands sold, after deducting erroneous entries.		Amount received in cash, Treasurer's receipts, and treasury notes.			Amount received in forfeited land stock and military scrip.		Amount of incidental expenses.	Amount paid into the treasury during the quarter.
	Acres.	Purchase money.	Cash.	Treasurer's receipts.	Treasury notes.	Forfeited land stock.	Military land scrip.		
Ohio	3,415.13	$6,339 05	$6,339 05	-	-	-	-	$1,145 30	$4,400 00
Indiana	13,697.57	17,009 45	16,668 45	-	-	$16 00	$325 00	1,897 78	8,140 06
Illinois	76,011.80	95,013 85	90,560 73	-	-	-	4,453 12	5,009 49	51,358 44
Missouri	166,097.61	207,619 78	207,406 03	-	-	-	213 75	6,831 66	218,644 13
Alabama	7,593.30	9,491 75	9,235 94	-	$105 81	-	150 00	2,590 25	4,456 65
Mississippi	3,893.40	4,866 77	4,866 77	-	-	-	-	1,362 53	1,082 40
Louisiana	9,614.44	12,018 04	12,018 04	-	-	-	-	1,642 82	7,000 00
Michigan	3,141.59	3,926 97	3,926 97	-	-	-	-	1,183 59	512 00
Arkansas	10,700.62	13,375 76	13,375 76	-	-	-	-	2,001 44	15,601 89
Wiskonsan Territory	56,842.83	72,710 01	72,710 01	-	-	-	-	2,492 62	63,966 58
Iowa Territory	19,835.70	24,794 64	24,694 64	-	-	-	100 00	1,025 33	12,363 07
Florida Territory	1,492.41	1,865 52	1,865 52	-	-	-	-	959 43	1,345 00
Grand Total	372,246.40	$469,031 59	$463,667 91	-	$105 81	$16 00	$5,241 87	$28,072 24	$388,870 22

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CANALS AND RAILROADS IN THE UNITED STATES.

RECEIPTS FOR 1843 AND 1844.

The following are the comparative receipts on important public works in various parts of the Union:

	1843	1844	Increase.
Western Railroad, Jan. to June 1 ...	173,959	230,903	32 per cent.
Schenectady and Troy, April to June 1	2,387	5,464	125 "
Tonawanda, Jan. to June 1	12,261	28,660	133 "
Reading Railroad, Jan. to June 1	43,875	114,122	172 "
New York and Erie for May	10,483	17,814	33 "
Norwich and Worcester, Jan. to June	45,563	75,286	75 "
Pennsylvania Canal, Delaware Division, March to June	9,330	20,384	120 "
Ohio Canals, November to May	88,729	172,659	95 "
Erie Canal, 45 days	481,253	596,738	20 "

The following are the earnings of the Boston and Providence Railroad for the first six months of 1843 and 1844:

	Receipts for 1843.	Receipts for 1844.
January	$12,486 55	$15,206 63
February	11,734 57	16,996 28
March	16,615 98	19,593 64
April	16,897 94	22,525 39
May	17,885 38	24,409 77
June	23,749 51	26,000 00 estimated.
	$99,369 93	$124,821 71
Mail, for six months ..	3,506 00	3,506 00
Rents	300 00	500 00
	$103,175 93	$128,827 71
Excess of receipts of six months in '44 over the same months in '43	35,651 73	Expenses in six months, say 58,000 00
	$128,827 71	$70,827 71
		Balance of income account 41,693 29
		$112,521 00

The freight has increased over last year as follows: to Way Stations, 96 per cent.; Local, 44 per cent.; and New York, 11 per cent.

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COMMERCE OF THE ERIE CANAL.

The following is a statement of the Produce and Tolls received at Albany from the commencement of canal navigation to the close of the first week in July.

		Canal open, May 1, 1843.	Canal open, April 18, 1844.
Tolls		$91,434 84	$142,734 91
Flour	bbls.	317,732	481,949
Pork		18,601	14,794
Beef		5,749	15,428
Ashes		19,102	23,688
Wheat	bush.	17,215	64,831
Corn		24,747	3,970
Barley		3,524	6,636
Cheese	lbs.	724,144	688,739
Butter and Lard		2,562,692	1,893,051
Wool		459,591	765,391

COMMERCE OF THE PENNSYLVANIA CANAL FOR THE MONTH OF JUNE, 1844.

IMPORTS.

Dry Goods	lbs.	1,108,167
Hardware		589,916
Queensware		247,683
Muslin		383,200
Groceries		401,347
Drugs and Dyes		232,502
Clay and Gypsum		175,504
Iron and Nails		620,867
Blooms		1,843,605
Pigs and Castings		782,484
Tobacco, manufactured		51,140
Leather		73,960
Liquor	galls.	39,673
Wool	lbs.	10,008
Copper and Tin		126,764
Coffee		1,342,472

EXPORTS.

Flour	bbls.	13,252
Seeds	lbs.	11,679
Pork	bbls.	5,941
Bacon	lbs.	1,696,307
Cheese and Butter		123,259
Lard and Tallow		169,376
Feathers		38,774
Wool		709,304
Cotton		148,289
Hemp		161,139
Tobacco		3,661,312
Hides		87,673
Furs and Pelts		11,688
Whiskey	galls.	11,966
Glass	boxes	146

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PATENT OFFICE OF THE UNITED STATES,

(From the Annual Report of the Commissioner of Patents, January 31, 1844.)

Number of patents issued in 1843	531
Number which have expired	446
Applications for patents	819
Caveats filed	315
Whole number of patents issued, up to January 1844	13,523

RECEIPTS AND EXPENDITURES OF THE PATENT OFFICE.

A.

Statement of receipts for Patents, Caveats, Disclaimers, Improvements, and certified copies, in the year 1843.

Amount received for patents, caveats, &c.	$33,913 53	
Amount received for office fees	1,402 28	
		35,315,81
Deduct repaid on withdrawals		6,026 66
		$29,289 15

B.

Statement of expenditures and payments made from the patent fund, by H. L. Ellsworth, Commissioner, from January 1 *to December* 31, 1843, *inclusive, under act of March* 3, 1839.

For salaries,	$16,350 00	
For temporary clerks	3,013 56	
For contingent expenses	4,404 76	
For the library	437 31	
For agricultural statistics	444 67	
For compensation to the chief justice of the District of Columbia	100 00	
		24,750 30
Leaving a nett balance to the credit of the patent fund		$4,538 85

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MORSE'S ELECTRO-MAGNETIC TELEGRAPH.

(*From the same Report.*)

Below will be found a description of the Electro-Magnetic Telegraph, illustrated by plates in language so familiar as to enable any person to understand one of the great improvements of the age—one that is destined to exercise a great and it is believed happy effect, in the transmission of intelligence from one section of the country to another. The choice as to the mode of communication, by wires placed within leaded pipes under ground, or through similar wires suspended in the air, has occasioned much perplexity to the scientific; but the latter will probably be found much the most economical in its first structure, as well as in the facility of repair. The rapidity of communication is truly astonishing; it is instantaneous. The rate at which the electro-magnetic fluid passes, according to Mr. Wheatstone, is 288,000 miles, equal to eleven and a half times around the globe, in one second. We see "the streak" of lightning in the heavens, but it leaves no trace; the stream of electricity has passed in less than the twinkling of an eye, and is gone far beyond our sight. In the same manner, with equal swiftness, the electro-magnetic fluid unerringly conveys the intelligence intrusted to its operation.

Foreigners are now claiming the merit of the invention to reduce this discovery to practice; yet history, it is believed, will hereafter accredit the highest and most deserved commendation to one of our countrymen.

A new field is thus laid open for the researches of science, and new discoveries may yet be expected; experiments have already been made in this country, with wires of 160 miles in length, insulated in coils, with perfect success. A small battery of 100 pairs of plates was sufficient for the operation of the whole distance. In effecting the transmission of intelligence by the telegraph, the artificial magnet created by electricity sets in motion an apparatus which gives on paper certain characters representing letters of the alphabet. Communications are thus recorded, either by day or night, on a revolving cylinder, without even superintendence, and may be transcribed at leisure.

The medium employed is simply a copper wire, insulated and extended on posts, at an expense not exceeding $150 per mile. It is confidently believed that proprietors will thus connect their dwellings with the places of their mechanical operations. How easily, for instance, could Boston and Lowell be thus connected. The same posts, too, would answer for many lines of communication. Each wire, however, must be insulated; and, strange as it may seem, if two wires are placed horizontally, at some distance apart, and one is charged, a similar effect will be produced on the other.

Among the most curious effects attending this discovery is the transmission of intelligence through a single wire at the same time from opposite points. Thus, on a wire reaching from Washington to Baltimore, a message by electricity will pass another traversing in the contrary direction, (turning out, as it were,) without any detention. Like the

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rays of light, electricity, too, is extremely subtle. Nor is the fact less astonishing, that the ground itself is a good conductor, and supplies the place of another wire, which is necessary in ordinary cases before any effect is produced.

DESCRIPTION OF THE TELEGRAPH.

The electro-magnet is the basis upon which this whole invention rests in its present construction; without it, it would entirely fail. The electro-magnet is produced by coiling around a bar of soft iron, made in the form of a horse-shoe, (fig. 1,) copper-wire previously covered, similar to bonnet-wire, and varnished to prevent metallic contact with each other and the iron, (fig. 2.) The two terminations of the wire thus surrounding the iron in a spiral form, are brought out at each end of the curved

Fig. 1.

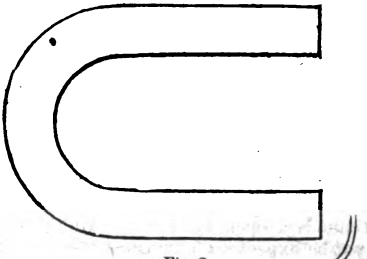
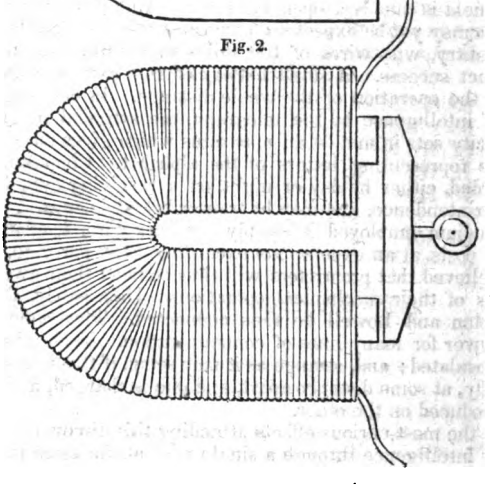


Fig. 2.



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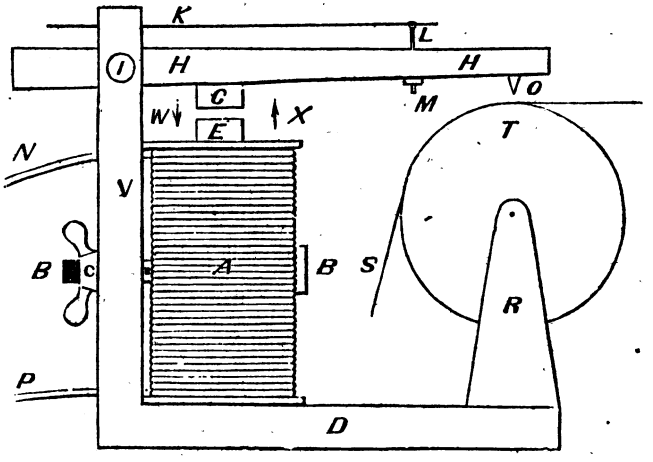
bar, and are connected, one with the zinc pole of a galvanic battery, the other with the platinum; the battery being prepared in the usual manner with its corroding acid, produces galvanic electricity, which starts off from one pole of the battery, follows the wire around the soft iron, and returns to the other pole of the battery by the other wire—thus forming a complete circuit. The galvanic fluid is now passing the whole length of the wire, and, while thus passing, the curved iron becomes a strong magnet. By connecting the two ends of the bent iron with a bar of similar soft iron, it will support many pounds weight. If, while in this condition, one of the wires is removed from the battery, the cross bar falls, and with it its weights. The curved iron returns instantly to its original state. It is unmagnetized. Complete the circuit, as at first, and in an instant it is again a magnet. Break the circuit, and it ceases to be a magnet. If the battery is placed 100, or 1000, or 10,000 feet from the magnet, yet, when the one is connected with the other by intervening wires, the effect upon the magnet is the same—making it a magnet when the circuit is complete, and *vice versa* when it is broken. In this way, power is produced at a point of considerable distance from the generating agent, and wholly at the command of the operator at the battery to make or destroy the power produced with the utmost possible rapidity.

Fig. 3.



The above figure represents the most simple form of the electro-magnet, with its appropriate machinery for telegraphic purposes. A, represents a side view of the bent iron bar, surrounded with its coils of copper wire, standing upon a platform D. V, being an upright arm secured to D, to which the magnet, or soft iron, is permanently fastened by means of the bolt B B B passing between the prongs of the curved iron, and through the board V, and adjusting screw C. E, is the projecting

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prong of the iron after it has passed through the coils—one only being seen. The other prong is directly behind E. G, represents the end of the iron bar, or keeper, extending back so far as to cover both the projecting ends of the horse-shoe-formed magnet. This iron bar, or keeper, is fastened to the lever H H, which is delicately adjusted so as to rise and fall by a pivot at I. K, represents a steel spring over the lever H H, and passes through a loophole L, formed from a brass wire; the lower part of the brass wire being secured to the lever H H, by means of a screw at M. O, is a hardened steel point, similar to those used by manifold letter-writers, and is also connected with the lever H H, and directly over the centre of the metallic roller T, in which a slight groove is made to correspond with the point of O. R, represents the standard in which the axis of the roller T freely revolves, and is a part of D. The line S represents the paper, in form of a ribbon, passing from its coil between the roller and the point of O. N and P are the two extremities of the wire upon the magnet, A. Every part is now described, and, from what has preceded the description, bearing in mind the effect of the battery when in action upon the soft iron, by forming a complete circuit with the wires N and P, the mode of writing by the instrument may be easily comprehended by what follows. Complete the circuit, and instantly the cross bar G approaches the ends of the *magnet* E, until they meet in the direction of arrow W. Break the circuit, and G is carried up in the direction of arrow X, by means of the spring K. If to the roller T clock-work is attached, to give it a uniform movement upon its axis, the paper S will move with the same uniform motion under the point O; then, by completing the circuit, the point O is brought down upon the paper, which is indented to such a degree as to make it perfectly apparent, and continues to mark it in that manner so long as the circuit is closed; but, upon breaking the circuit, the marking ceases, and the point O flies from the paper, which continues passing on. If the circuit is closed and broken with the utmost rapidity, then a succession of dots and spaces upon the paper appears. If the circuit is successively closed and broken with less rapidity, short lines and intervening short spaces are made. If closed for a longer time and broken in succession, then the marks become longer; so that dots, short lines, long lines, and short or long spaces, are made according to the time the circuit is closed, and the rapidity with which the paper moves under the pen. An arbitrary arrangement of these dots, short and long spaces and lines, constitutes the telegraphic alphabet; by means of which intelligence to any extent is communicated. Thus one dot may represent A, two dots B, three dots C, one dot and a line D, &c. The paper to be imprinted is fixed upon a revolving cylinder, and records despatches day and night; and this without ink, as the impressions are easily read even by the blind. The records of the night continue entered on the morning. The alphabet is easily learned.

We have said that the best mode of laying the conductors is not yet decided upon, whether beneath the ground in pipes, or above the ground upon poles—a plan early proposed by Professor Morse, in the report to Congress in 1838. Probably both modes, to a certain extent, according to circumstances, will be adopted.

"Twenty miles, on the Great Western railway in England, have been

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laid down, and brought into operation in May last. A double line is also laid down on the Blackwall railway, and others on the Leeds and Manchester, and Edinburgh and Glasgow railways."

"More recently, Mr. Cooke, after extensive experiments at his own residence, carried out, on the Great Western railway, a plan of suspending the conducting-wires in the open air, from lofty poles. Its leading advantages are—1st. Diminishing cost; 2d. Superior insulation; 3d. Facility of repair. The old plan consisted of laying copper wires, covered with cotton, and carefully varnished, into smooth iron tubes, with frequent arrangements for obtaining access to the wires, and for the facility of examination and repairs. The tube, after being carefully tarred, was either buried in the ground, or fixed on low posts and covered with a wooden rail. This plan will still be occasionally applied, in conjunction with the new one, in tunnels, towns, &c.

"The last advantage which need be noticed, in connection with this important step (placing on poles) in the invention, arises from the very perfect insulation from the earth. This allows of the employment as half of the conducting circuit, without risk of the current finding a shorter course through some imperfectly insulated point. For nearly two years, Mr. Cooke has tried this plan successfully on the Blackwall railway, and since on the Manchester and Leeds railway; but, when the wires are enclosed in an iron pipe, there is always danger of a contact—either partial, from a few drops of moisture, or perfect, from the metals of the wire and pipe touching; in which case, the electricity takes a shorter course, instead of performing its entire circuit, and no signal is given at the distant terminus, though appearing very strong at the point whence it sets out. With the wires suspended in the air, no such danger exists; whilst two advantages spring from the employment of the earth as a conductor. 1st. One wire is saved in each circuit, thus diminishing complexity and cost; 2d. The earth, acting as a great reservoir of electricity, or, as some think, as an excellent conductor, the resistance offered to the transmission of electricity is vastly diminished, and the battery is able to work through a much greater distance with a small conducting-wire."—*Civil Engineer and Architect's Journal*, June 1843, *page* 21.

The following experiment, recently tried at Washington, shows, in an interesting manner, the rapidity with which intelligence is transmitted. As the train of cars was coming from Baltimore, a person stationed four miles off, at the instant the locomotive was opposite to him, gave notice of the fact that the cars were coming; and this news was received, and the acknowledgment of its reception at Washington returned before the last car of the train had passed. As each circuit, to be complete, must, in both cases, reach from one end to the other, and back, the whole distance, thus traversed in the time mentioned above, must have been sixteen miles, besides the stopping of the machinery.

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The following description of the *practical operation* of the TELEGRAPH, is extracted from one of the public journals of the day, June 4th, 1844.

"The recent Conventions in Baltimore, and the transmission of the intelligence of their results to Washington, by means of Professor MORSE's admirable invention, have established its complete success. By its agency, the doings of the Conventions were known at the Capitol, nearly forty miles distant, almost as soon as the Secretary of the Convention itself could record them. Time and space are annihilated by this invention, for the transmission of intelligence around the whole globe would be instantaneous, if the magnetic wires were laid; and it could be done with equal facility, by night as by day, in storm as in sunshine. Professor Morse has tested by experiment, that although the power of the magnet diminishes for the first ten miles, there is no perceptible diminution afterwards, within the limits between Baltimore and Washington, to which the experiment has been extended, viz: thirty-three miles. From the tenth to the thirty-third mile inclusive, the weight sustained by the magnet was a constant quantity. And the presumption is, that the same law holds good for any greater distance. The scientific facts on which Professor Morse's invention rests, are thus stated by a Committee of Congress.

"1. That a current of electricity will pass to any distance along a conductor connecting the two poles of a voltaic battery or generator of electricity, and produce visible effects at any desired points on that conductor.

"2. That magnetism is produced in a piece of soft iron (around which the conductor in its progress is made to pass) when the electric current is permitted to flow, and that the magnetism ceases when the current of electricity is prevented from flowing. This current of electricity is produced and destroyed by breaking and closing the galvanic circuit at the pleasure of the operator of the telegraph, who in this manner directs and controls the operation of a simple and compact piece of mechanism, styled the register, which at the will of the operator at the point of communication is made to record, at the point of reception, legible characters, on a roll of paper put in motion at the same time with the writing instrument.

"The dots, and the horizontal lines produced by the elongation of the dot, have been formed into signs, which designate the letters of the alphabet, extremely simple, as will be seen in the following *fac simile* of their appearance on paper:

ALPHABET.

A	· —	N	— ·
B	— · ·	O	· ·
C	· · ·	P	· · · · ·
D	— · ·	Q	· · —
E	·	R	· · ·
F	· — ·	SZ	· · ·
GJ	— — ·	T	—
H	· ·	U	· · —
IY	· ·	V	· · · —
K	—	W	· — —
L	—	X	· — ·
M	— —		

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NUMERALS.

1	· — — — ·	6	· · · · · ·
2	· · — — · ·	7	— — — · ·
3	· · · — — ·	8	— · · · ·
4	· · · · — —	9	— · · — —
5	— — — — —	0	— — — — —

"The register or machine, which produces these characters, we are told by the Journal of Commerce, is moved by a weight like a clock, the slip of paper being wound about a cylinder, and carried under the style by the operation of the machinery. To the style or pen which makes the marks, is attached a piece of iron, resting just above a mass of soft iron, which last is instantly rendered a magnet by the transmission of the electric current. This current is transmitted by means of protected wires, supported at suitable distances and at a proper elevation, by posts or spars. Suppose the operator to be at Washington, and that he wishes to transmit intelligence to Baltimore. He has before him the two extremities of the wires, and the means of sending along a current of the electric fluid. The instant he brings them together, the soft iron mass in Baltimore becomes a magnet—the iron above it is drawn towards it; and the style to which it is attached, is pressed upon the paper, and this, being carried forward by the machinery which is at the same instant by another magnet set in motion, receives the impression. As soon as the two wires are separated, the soft iron is no longer a magnet; the iron above is no longer attracted, and the pen no longer rests upon the paper. By bringing the wires in contact and instantly separating them, a *dot* is made; by keeping them in contact for a little time, a *dash;* and by the combination of these two, all the words in the language, and all the numerals, may be written and read.

"By means of this Telegraph, twelve to twenty characters of the alphabet can be transmitted in a minute; or as fast as a printer could set up the types. So if the communication were complete from Washington to New Orleans, the President's message, if not unreasonably long, might be read entire in the latter city, in twenty-four hours after it was delivered; and portions of it in much less time. Besides the alphabet, there are a great number of other conventional signs, designating sentences in common use, such as 'are you ready'—'will send answer in (—) minutes'—'stop for a short time'—'we are ready for your communication,' &c. &c."

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COAST SURVEY OF THE UNITED STATES.

Directions of the Treasury Department in regard to the operations of the Coast Survey for 1844–5.

THE following arrangements have been approved by the Treasury Department, and I have been directed to communicate them to the assistants and others employed on the work.

I. OF THE PRIMARY AND MAIN TRIANGULATIONS, AND OBSERVATIONS CONNECTED THEREWITH.

1. A primary triangulation, connected with the base of verification near the north end of the present main triangulation, will be carried eastward, across Massachusetts, by the superintendent, who will be accompanied by sub-assistant C. O. Boutelle.

The requisite astronomical and magnetic observations will be made, in connexion with this triangulation, by the superintendent and an assistant from the army, if the detail of one can be procured.

2. The main triangulation, on Long Island Sound and eastward, will be verified by a base measured, as near as practicable, to the present northern termination. Seekonk plain will be examined in reference to this object.

The latitude of a point at the southern, and of one at the northern, end of this triangulation, and the azimuths of suitable lines will be determined as soon as the season may permit.

3. The primary triangulation, at its southern end near the Delaware, will be connected suitably by a main series with the work on the lower part of the bay. The main series, or as large a secondary series as the nature of the country may allow, will be carried around Cape Henlopen southward.

Observations for latitude and azimuth will be made at one of the Delaware bay stations.

The duties in paragraphs 2 and 3 are assigned to assistant Edmund Blunt, who will have with him sub-assistant S. V. Talcott.

4. The primary triangulation will be continued from its southern termination, as left by Mr. Hassler, to a base of verification as near its southern termination as practicable. This base will be measured, and the necessary astronomical observations be made, at one of the ends.

These duties are assigned (according to instructions given in January last) to assistant James Ferguson, who will have with him sub-assistants J. C. Neilson and Richard Cutts, during the measurement of the base. Subsequently, when engaged in triangulation, Mr. Ferguson will have one sub-assistant.

5. A base will be measured in North Carolina for the continuation of the survey southward. The parties of the superintendent and assistant Ferguson will be united in the autumn, if practicable, for the measurement of this base.

6. A reconnoissance will be commenced of the country, between the

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head of the Chesapeake and Washington City, and down the Potomac river and Chesapeake bay.

7. A reconnoissance will, if practicable, be commenced in Louisiana, Mississippi, and Alabama.

8. Astronomical and magnetic observations, in addition to those already specified, will be made at suitable points within the limits of the survey, as directed in Art. I. of the plan for the re-organization of the survey of the coast. The difference of longitude between some well determined European observatory and a point connected with the survey, will be determined as soon as practicable.

9. The views required of and from the primary stations of the survey will be made by assistant John Farley.

10. The superintendent will furnish instructions in regard to the order in which it is expedient to carry out these directions, and in reference to their details, and will present at the proper time to the department for approval, directions in regard to the execution of articles 6, 7, 8.

II. SECONDARY AND OTHER TRIANGULATIONS.

1. A secondary triangulation suitable for the determining of points for the plane-table parties, will be carried from Seakonnet rock eastward along the coast of Massachusetts, by assistant C. M. Eakin.

2. A secondary triangulation to determine points for the plane-table work will be carried down the Chesapeake bay.

The assignment of this duty will be made when it is ascertained whether assistants from the army can be obtained for its execution.

3. A secondary triangulation will be carried from Cape Henlopen southward, to furnish points for the plane-table parties. This will be assigned during the progress of the season's work.

4. The filling up by subsidiary triangulation of such parts of the triangulation now made on the Chesapeake bay, as may require it, to adapt it to the use of the plane-table parties, will be assigned to those parties by the superintendent if the same is deemed expedient.

III. TOPOGRAPHICAL WORK.

1. The topographical work on the southern shore of the island of Rhode Island, the eastern shore of Narragansett bay and east of Seakonnet rock, will be carried on by assistants W. M. Boyce and H. L. Whiting. The latter will temporarily assist Mr. Eakin in preparing for his triangulation.

2. The topographical work in the Delaware will be completed by assistant J. J. S. Hassler, who will, at its completion, remove his party to the Chesapeake, or south of Cape Henlopen on the outer shore, according to directions then to be given.

3. The topography of parts of the Chesapeake near Annapolis, the mouth of the Patapsco, and the head of the bay, will be executed by assistant F. H. Gerdes, and sub-assistant G. D. Wise.

4. Duty on the Chesapeake will be assigned to a topographical party

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to consist of officers of the army, if one should be detailed by the War Department for that purpose.

5. The parties at work on the Chesapeake will, when the season requires it, be transferred to the outer side of the Peninsula.

6. The particular locations of the work will be designated in the instructions of the superintendent.

IV. HYDROGRAPHIC OPERATIONS.

1. The hydrography of the southern coast of Rhode Island and Massachusetts, and of the islands upon the coast, will be executed by the party under the command of Lieut. Com. George S. Blake.

2. Further observations of the currents and tides in New York bay and harbour will be made. Observations of the tides and currents will, if practicable, be made at several points on the coast, within the limits of the survey.

The assignment of this duty will be made hereafter.

3. The deep water soundings on the coast of New Jersey, and the soundings of the inlets, will be completed by the party under the command of Commander Gedney.

4. The hydrography of Delaware river will be completed by the party under the command of Lieut. Com. George S. Blake.

5. The soundings in the upper part of the Chesapeake bay will be commenced by a party under the command of Lieut. Com. George M. Bache, he having been detailed by the Navy Department for service on the work.

6. The soundings off the coast of Delaware and Maryland, south of Cape Henlopen, will be commenced, if practicable, during the present season.

7. The sketches of the topography of the coast, required by these parties, will be made by assistant John Farley, who will also complete the reduction of the hydrography executed by Commander Gedney's party.

8. The services of Mr. B. Gluck will be continued, if required, as draughtsman to Lieut. Com. Blake's party.

V. OF THE OFFICE, ENGRAVING, &c.

1. Lieutenant A. A. Humphreys, of the Topographical Engineers, having been detailed by the War Department for the purpose, the duties of the assistant in the office are assigned to him.

2. W. C. Fairfax, now in the office engaged as draughtsman, will be retained at the compensation heretofore fixed, of one thousand dollars per annum.

3. A second draughtsman will be added during the course of the year, if required, or one of the present sub-assistants will be placed in the office.

4. The reduction of the topographical part of the map of Delaware bay and river, will be commenced as soon as practicable.

5. The engraving of the maps of New York bay and harbour, and of

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others hereinafter directed, will be prosecuted vigorously; to which end the following arrangements for engraving are made:

Messrs. Siebert, Rolle, Dankworth, and Lawson, will remain at the rates of compensation now paid to them, respectively.

Two additional engravers will be employed, at a salary not to exceed one thousand dollars each. Two youths may be engaged to serve under Mr. Siebert, and to receive instruction from him.

6. Mr. Benner, and his assistant, will be retained for the printing of the maps, at their present rates of compensation. When Mr. Benner's services are not required for printing, he will be expected to do the duties of clerk in the office. His assistant will also act as janitor, or do labourer's duty, if required, in the building.

7. The engraving of the chart of Long Island Sound will be commenced as soon as practicable.

8. The special supervision, under the direction of the superintendent, of the engravings, especially in relation to the order and manner of execution of the details, is assigned to assistant John Farley; the duty to be executed at such times as will not interfere with the duties already assigned to him.

(Signed) A. D. BACHE,
Superintendent Coast Survey.

WASHINGTON, March 30, 1844.

DAMAGES ON PROTESTED BILLS OF EXCHANGE IN THE DIFFERENT STATES AND TERRITORIES.*

MAINE.—Payable out of the state, and in New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut or New York, 3 per cent; in New Jersey, Pennsylvania, Delaware, Maryland, Virginia, or District of Columbia, 5 per cent; in North Carolina, South Carolina, or Georgia, 6 per cent; at any other place in the United States or Territories, 9 per cent; at any place out of the United States or Territories, 10 per cent; payable within the state, at not less than 75 miles distance, in sums of $100 and over, 1 per cent.

NEW HAMPSHIRE.—[In this state there is no existing statue regulation on the subject. The usual practice has been to charge the rate of damages existing at the point where the bill was payable.]

VERMONT.—[No statute regulation on this subject exists in this state. The practice has been similar to that in New Hampshire.]

MASSACHUSETTS.—Payable out of the United States, except beyond the Cape of Good Hope, 5 per cent; beyond the Cape, 20 per cent; in Maine, New Hampshire, Vermont, Rhode Island, Connecticut, and New York, 2 per cent; in New Jersey, Pennsylvania, Delaware, and Mary-

* As regulated by the laws of the different states.

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land, 3 per cent; in Virginia, District of Columbia, Georgia, and North and South Carolina, 4 per cent; elsewhere in the United States or Territories, 5 per cent. Within the state, not less than 75 miles distant, in sums not less than $100, one per cent.

RHODE ISLAND. — Payable without the United States, 10 per cent; within the United States, and out of Rhode Island, 5 per cent.

CONNECTICUT.—Payable in the city of New York, 2 per cent; in New Hampshire, Maine, Vermont, Massachusetts, Rhode Island, New York, (out of the city,) New Jersey, Pennsylvania, Delaware, Maryland, Virginia, or District of Columbia, 3 per cent; in North Carolina, South Carolina, Georgia, or Ohio, 5 per cent; in any other State or Territory, 8 per cent.

NEW YORK. — Payable in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Pennsylvania, Ohio, Delaware, Maryland, Virginia, or District of Columbia, 3 per cent; in North Carolina, South Carolina, Georgia, Kentucky, or Tennessee, 5 per cent; at any other place in the United States, or on this continent north of the equator, or the West Indies, or elsewhere in the West Atlantic Ocean, 10 per cent; in Europe, 10 per cent.

NEW JERSEY.—[There are no statute regulations on this subject in New Jersey.]

PENNSYLVANIA. — Payable out of this state, in the United States, or Territories, except Louisiana, 5 per cent.; in Louisiana, or any other state in North America, or the Islands thereof, except the Northwest Coast of America and Mexico, or in any of the West India or Bahama Islands, 10 per cent.; in Madeira, the Canaries, the Azores, the Cape de Verds, the Spanish Main or Mexico, 15 per cent.; in any place in Europe or the islands thereof, 20 per cent.; at any other place in the world, 25 per cent.

DELAWARE. — Payable at any place within the United States, or Territories, out of Delaware, 5 per cent.; at any place in Europe, 20 per cent.

MARYLAND. — Payable without the state, and at any place in the United States, or Territories thereof, 8 per cent.; in any foreign country, 15 per cent.

VIRGINIA. — Payable out of the state, at any place within the United States, or Territories, 3 per cent.; in any foreign country, 15 per cent.

NORTH CAROLINA. — Payable in any of the United States, except Louisiana, 6 per cent.; at any other place in North America, on the Northwest Coast, in the West Indies, or Bahama Islands, 10 per cent.; in Madeira, the Canaries, the Azores, Cape de Verds, or other place in Europe, or South America, 15 per cent.; in any other part of the world, 20 per cent.

SOUTH CAROLINA. — Payable within the United States, at any place out of South Carolina, 10 per cent.; in any other part of North America, or the West India Islands, 12½ per cent.; in any other part of the world, 15 per cent.

GEORGIA. — Payable in any part of the United States, or Territories, out of Georgia, 5 per cent.; at any place without the United States, 10 per cent.

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ALABAMA. — Payable out of the state, and at any place within the United States, or Territories, 10 per cent.; in any place beyond the United States, 20 per cent.

MISSISSIPPI.—Payable at any place out of the state, within the United States, 5 per cent.; at any place out of the United States, or Territories, 10 per cent.

LOUISIANA.—Payable at any place out of the state, within the United States, or Territories, 5 per cent.; at any place without the United States, 10 per cent.

TENNESSEE. — Payable without the state, at any place in the United States, or Territories, 3 per cent.; in any other place in North America, on the Gulf of Mexico, or West India Islands, 15 per cent.; in other parts of the world, 20 per cent.

KENTUCKY.—On foreign bills, 10 per cent. damages are allowed. On inland bills, damages are governed by the law of the place.

OHIO.—Payable at any place without the United States, 12 per cent.; within the United States, at any place out of Ohio, 6 per cent.

INDIANA. — Payable at any place without the United States, 10 per cent.; at any place within the United States, out of Indiana, 5 per cent. Drawer or endorser not liable for damages, if paid at maturity, with costs.

ILLINOIS. — Payable at any place without the United States, 10 per cent.; at any point within the United States, and out of Illinois, 5 per cent.

MISSOURI. — Payable at any place within the state, 4 per cent.; out of the state, and within the United States, 10 per cent.; at any place out of the United States, or Territories, 20 per cent.

MICHIGAN. — [No statute regulation has as yet been adopted in this state.]

ARKANSAS. — Payable at any place within the state, 2 per cent.; in Alabama, Louisiana, Mississippi, Tennessee, Kentucky, Ohio, Indiana, Illinois, Missouri, or at any place on the Ohio river, 4 per cent.; in any other place in the United States, or Territories, 5 per cent.; at any place out of the United States, 10 per cent.; together with costs and interest at the rate of 10 per cent. per annum.

FLORIDA.—Same as the state of Alabama.

WISKONSIN.—Payable at any place without the United States, 20 per cent.; out of the Territory, adjoining the same within the United States, 5 per cent.; in the United States, not adjoining the Territory, 10 per cent.

IOWA.—The same as in the Territory of Wiskonsin.

DISTRICT OF COLUMBIA. — [The rates established in Maryland and Virginia, are charged on protested bills in the District.]

In Europe, damages on protested bills of exchange, are what will enable the holder to purchase a new bill, at the current rate of exchange, together with interest and all charges, such as protest, postages, and commissions.

There is no general law in the United States on the subject; and damages are regulated by statute in the different states, varying in some instances widely, as will be seen by the preceding table.

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The amount due and damages are usually calculated after the rate of exchange where the bill is returned, and not on the face of it; unless the contents of the bill are expressed in federal money, in which case the damages are ascertained without reference to the rate of exchange.

Merchant's Magazine.

LEGAL RATES OF INTEREST

IN THE

DIFFERENT STATES AND TERRITORIES.

STATES.	Rate of Interest.	PUNISHMENT OF USURY.
Maine,	6 per ct.	Forfeit of the debt or claim.
N. Hampshire,	6 per ct.	Forfeit of three times the amount unlawfully taken.
Vermont,	6 per ct.	Recovery in an action, with costs.
Massachusetts,	6 per ct.	Forfeit of threefold the usury.
Rhode Island,	6 per ct.	Forfeit of the usury and interest on the debt.
Connecticut,	6 per ct.	Forfeit of the whole debt.
New York,	7 per ct.	Usurious contracts void.
New Jersey,	6 per ct.	Forfeit of the whole debt.
Pennsylvania,	6 per ct.	Forfeit of the whole debt.
Delaware,	6 per ct	Forfeit of the whole debt.
Maryland,	6 per ct.	On tobacco contracts, 8 per cent. Usurious contracts void.
Virginia,	6 per ct.	Forfeit double the usury taken.
North Carolina,	6 per ct.	Contracts for usury void—forfeit double the usury.
South Carolina,	7 per ct.	Forfeit of interest, and premium taken, with costs to debtor.
Georgia,	8 per ct.	Forfeit of three times the usury, and contracts void.
Alabama,	8 per ct.	Forfeit of interest and usury.
Mississippi,	8 per ct.	By contract as high as 10.—Usury recoverable in action of debt.
Louisiana,	5 per ct.	Bank interest 6; conventional, as high as 10; beyond, contract void.
Tennessee,	6 per ct.	Usurious contracts void.
Kentucky,	6 per ct.	Usury may be recovered, with costs.
Ohio,	6 per ct.	Usurious contracts void.
Indiana,	6 per ct.	Penalty of usury, a fine of double the excess.
Illinois,	6 per ct.	By agreement as high as 12 per cent; if beyond, forfeit threefold amount of the whole interest.
Missouri,	6 per ct.	By agreement as high as 10 per cent. If beyond, forfeit of whole interest due, and of the usury taken.
Michigan,	7 per ct.	Forfeit of the usury taken, and one fourth the debt.
Arkansas,	6 per ct.	By agreement, any rate not exceeding 10. Amount of usury recoverable, but contracts void.
Dist. Columbia,	6 per ct.	Usurious contracts void.
Florida,	8 per ct.	Forfeit of interest and excess, in case of usury.
Wisconsin,	7 per ct.	By agreement not exceeding 12. Forfeit treble the excess.
Iowa,	7 per ct.	By agreement as high as 12. Forfeit treble the excess.

☞ On debts or judgments in favour of the *United States*, interest is computed at the rate of 6 per cent. per annum.

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RELIGIOUS STATISTICS OF THE UNITED STATES.

It is believed that the following compilation presents a fuller statistical detail of the different denominations in the United States than any other before offered to the public. Great pains have been taken to procure accurate information, and the compiler gratefully acknowledges his obligations to several clergymen of high standing in the different churches, for valuable inedited materials with which he has been favoured by them, for insertion in these tables.

It is, however, a matter of regret, that some of our churches neglect, or even avoid, the publishing of their respective religious statistics, in consequence of which, a compilation, like the present, must necessarily remain imperfect. The next volume of the Almanack will contain, it is hoped, a more complete synopsis of American Religious Statistics.

PROTESTANT EPISCOPAL CHURCH.

Dioceses.	Bishops.	Clergy.	Churches.
Maine		6	5
N. Hampshire		10	12
Vermont	T. H. Hopkins, D. D., Burlington	29	37
Massachusetts	M. Eastburn, D. D., Boston.....	58	43
Rhode Island.	T. P. K. Henshaw, D. D., Providence.....	25	30
Connecticut..	T. C. Brownell, D. D., Hartford.....	102	88
New York ...	B. T. Onderdonk, D. D., New York.....	202	155
Western N.Y.	W. H. Delancey, D. D., Geneva	105	166
New Jersey .	G. W. Doane, D. D., Burlington	47	40
Pennsylvania	H. U. Onderdonk, D. D., Philadelphia.....	115	110
Delaware....	A. Lee, D. D., Wilmington.....	11	16
Maryland....	W. B. Whittingham, D. D., Baltimore	93	100
Virginia	W. Meade, D. D., Milwood		
	I. Johns, D. D., Assistant Bishop, Richmond	98	100
N. Carolina ..	L. S. Ives, D. D., Raleigh.....	32	35
S. Carolina ..	C. E. Gadsden, D. D., Charleston.....	49	40
Ohio.....	C. P. M'Ilvaine, D. D., Gambier	62	9
Georgia	S. Elliott, D. D., Savannah.....	14	75
Kentucky ...	B. B. Smith, D. D., Louisville	22	30
Tennessee	T. G. Otey, D. D. Columbia	12	14
Mississippi		11	12
Arkansas		2	3
Louisiana	L. Polk, D. D., Thibadeauxville.....	7	8
Alabama		10	11
Michigan....	S. A. M'Coskry, D. D., Detroit	24	30
Illinois	P. Chase, D. D., Peoria.....	14	15
Florida.....		4	5
Indiana	T. Kemper, D. D., St. Louis.....	15	14
Missouri		10	12
Wiskonsan		11	12
Iowa		4	5
		1204	1232

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THEOLOGICAL SEMINARIES.

Location.	President of Faculty.	Number of Students.
New York...	B. T. Onderdonk, D. D.....	74
Alex'dria, D.C.	W. Meade, D. D.	46
Gambier, Ohio	C. P. M'Ilvaine, D. D.....	10
Lexington, Ky	.....	

ROMAN CATHOLIC CHURCH.

Dioceses.	Comprising	Bishops.	Clergy.	Churches.
Baltimore ...	Maryland, & D. of Co.	S. Eccleston, D.D., *Arch.*	79	73
Boston	Me., N. H. Vt., Mass.	B. Fenwick, D. D.....	27	34
Hartford	Conn. and R. Island .	W. Tyler, D. D.	7	8
New York...	N. Y. & Eastern N. J.	T. Hughes, D. D.....		
Philadelphia .	Eastern Pa., Del. & Western N. J.	T. M'Closkey, *Coad.* ...	86	97
		F. P. Kenrick, D. D. ...	43	65
Pittsburg ...	West. Pennsylvania .	M. O'Connor, D. D.	21	42
Richmond ...	Virginia	R. V. Whelan, D. D. ...	8	13
Charleston...	N. C., S. C., & Geo. .	J. Reynolds, D. D.	19	18
Mobile	Alabama & Florida..	M. Portier, D. D.	18	7
New Orleans	Louisiana	A. Blanc, D. D.	52	42
Natchez	Mississippi	T. T. Chanche, D. D. ..	8	5
Louisville ...	Kentucky	B. J. Flaget, D. D.....		
		J. I. Chabrat, D.D., *Coad.*	50	40
Nashville....	Tennessee	R. P. Miles, D. D.	7	6
Cincinnati ...	Ohio	T. B. Purcell, D. D.....	53	70
Vincennes ...	Ia. & East. Illinois...	C. De la Hailandière, DD.	38	62
St. Louis	Mo., West. Illinois & Arkansas	J. R. Kenrick, D. D. ...	87	71
Detroit	Michigan	T. Rézé, D. D.....		
		P. Lefevre, D. D., Coad.	14	37
Milwaukie ..	Wiskonsan.....	T. M. Henri, D. D.	5	25
Dubuque	Iowa	M. Loras, D. D.	12	12
	Dioceses recently created.			
Chicago	Illinois	W. Quarter		
Little Rock ..	Arkansas	A. Byrne.....		
Oregon	Oregon	F. N. Blanchet, *Vic. Apos.*	6	
			640	727

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THEOLOGICAL SEMINARIES.

Location.	Superior.	Students.
Borromeo Seminary, Philadelphia..	M. Maller, A. M.....	33
St. Mary's, Baltimore, ...	L. R. Deluot, D. D...	20
Emmitsburg, Md.	J. M'Caffrey, A. M...	25
Rosehill, N. Y.	A. Penco..... .	31
Vincennes, Ind.....		20
St. Louis, Mo.	M. Ainat	16
Richmond, Va.	R. V. Whelan, D. D..	13
St. Francis, Browne Co., Ohio	T. Burland	12
Assumption, La.	B. Akmengal	10
Charleston, S. C.	J. O. Sullivan	9
Nashville, Tenn.....	A. J. Memany	4
Marion, Ky.....	P. Chandy.	

MORAVIAN CHURCH, OR UNITED BRETHREN.

Bishops.	Residence.
A. Benade,.....	Bethlehem, Pa.
W. N. Van Vleek, ...	Salem, N. C.

The Moravian Church m the United States, numbers 30 Ministers; 25 Congregations, and 6000 Communicants. Population, 25,000. The Theological Seminary is at Nazareth, Pa. *Principal*, J. Herman. *Students*, 6.

ORTHODOX CONGREGATIONALISTS.

These churches, 1500 in number, are under the care of 1350 Ministers. Communicants, 180,000.

Theological Seminaries and number of Students.

Andover, Mass.....	153
Bangor, Me.	44
Gilmantown, N. H.....	26
Theological Department, Yale College, Conn.	72
Do. do. Oberlin Institute, Ohio.	54
East Windsor, Conn.	29

UNIVERSALISTS.

This denomination contains 1 General Convention; 15 State Conventions; 68 Associations; 646 Ministers; 990 Churches, and 100,000 Members.

CHRIST-IANS, OR CHRIST-IAN CONNEXION.

The Rev. D. Hillard, a minister of this connexion, in a recent publication, gives the statistics as follows:—42 Conferences; 1500 Ministers; 500 Licentiates; 1500 Churches, and 325,000 Communicants.

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REGULAR BAPTISTS.

States.	Associations.	Churches.	Ministers.	Licentiates.	Communicants.
Maine	13	296	215	35	23,860
New Hampshire	7	110	84	1	10,825
Vermont	9	127	93	10	10,404
Massachusetts	11	209	196	30	30,842
Rhode Island	2	40	44	6	7,560
Connecticut	6	107	104	16	15,340
New York	42	812	733	124	98,557
New Jersey	4	88	80	18	11,452
Pennsylvania	15	275	178	45	27,285
Maryland	2	20	13	2	2,070
Virginia	24	498	245	35	75,934
North Carolina	23	467	270	56	32,396
South Carolina	12	374	213	27	38,677
Georgia	28	652	297	101	43,573
Florida	1	17	8	1	670
Alabama	13	360	158	41	25,651
Louisiana	4	63	34	9	2,737
Mississippi	14	293	140	24	16,305
Arkansas	5	51	26	5	1,621
Tennessee	19	360	226	61	25,431
Kentucky	40	643	282	78	59,015
Missouri	19	247	124	27	14,368
Illinois	19	255	173	48	11,270
Indiana	21	306	141	44	15,795
Ohio	25	444	290	50	26,560
Michigan	9	151	101	18	7,940
Wiskonsan	1	34	23	2	1,284
Iowa	3	34	17	2	857
	391	7,333	4,508	916	638,279

ANTI-MISSION REGULAR BAPTISTS.

	Association.	Churches.	Ministers.	Licentiates.	
	149	1,907	865	88	69,663
Grand Total	540	9,230	5,373	1,004	707,942

THEOLOGICAL SEMINARIES, WITH THE NUMBER OF STUDENTS.

Thomastown, Me. 23
Newton, Mass. 33
Hamilton, N. Y. 27
Furman Seminary, S. C. 30
Eaton, Ga. 10
Granville, Ohio 8
Alton, Ill.
Covington, Ky.

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FREE WILL BAPTISTS.

The following are the religious statistics of this connection: 1 General Conference; 22 Yearly Meetings; 103 Associations; 1165 Churches; 771 Ministers; 150 Licentiates; and 61,400 Communicants.

SEVENTH DAY BAPTISTS.

This connection embraces:—1 General Conference; 4 Associations; 70 Ministers; 60 Churches; and 6000 Communicants.

WINEBRENNARIANS.

This connection, which calls itself the "Church of God," but is more generally known by the name of the Founder, embraces 3 Elderships or Districts; 100 Ministers; 300 Churches; 15,000 Communicants.

PRESBYTERIAN CHURCH: (OLD SCHOOL.)

Synod.	State.	Clerk.	Clergy.	Ch's.	Communicants.
Albany	N. York	R. Smith	77	47	7,706
Buffalo	"	T. C. Lord, D. D.	30	26	2,290
New York	"	T. M. Krebs, D. D.	98	74	11,518
New Jersey	N. J. and East Pa.	R. K. Rogers	134	121	16,541
Philadelphia	Eastern Pa.	H. Wilson, D. D.	158	201	23,469
Pittsburg	Western Pa.	W. Jeffery	121	185	17,330
Wheeling	West. Pa. & W. Va.	C. C. Beattie, D. D.	62	97	9,647
Ohio	Ohio	L. Brown	80	135	9,673
Cincinnati	"	S. Steele	81	121	9,105
South Indiana	Indiana	P. D. Gurley	47	94	4,974
North Indiana	Ind. & Mich.	E. W. Wright	22	48	1,637
Illinois	Ill. & Iowa	T. G. Bergen	48	106	2,992
Missouri	Missouri	W. S. Potts, D. D.	29	71	3,005
Kentucky	Kentucky		75	127	8,161
Virginia	Eastern Va.	W. S. Plumer, D. D.	111	137	1,005
N. Carolina	N. Carolina	C. M'Ivor	80	137	9,422
Tennessee	Tennessee	T. T. Edgar, D. D.	42	75	4,036
S. Carolina	S.C., Geo. & Florida	B. Gildersleeve	110	185	8,498
Alabama	Alabama	R. Hall	42	74	3,232
Mississippi	Miss, Ark. & La.	T. H. Vancourt	61	92	3,206
20 Synods.		Ordained ministers	1508	2153	157,447
		Licentiates	207		
			1715		

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THEOLOGICAL SEMINARIES.

Location.	Principal.	Students.
Princeton, N. J.	N. Alexander, D. D.	105
Allegheny City, Pa.	D. Elliott, D. D.	54
Union, Va.	J. R. Wilson, D. D.	22
Columbia, S. C.	A. Leland, D. D.	
New Albany, Ia.	T. Matthews, D. D.	29

PRESBYTERIAN CHURCH: (NEW SCHOOL.)

Synod.	State.	Clergy.	Churches.	Communicants.
Albany	New York	86	88	7,683
Utica	"	77	72	7,768
Geneva	"	190	189	18,628
Genesee	"	148	141	10,113
New York	N. York & N. Jersey	146	114	18,438
Eastern Pennsylvania	Pennsylvania	67	67	10,531
Western Pennsylvania	"	20	27	1,865
Virginia	Virginia, Md., & D. C.	25	39	3,178
Ohio	Ohio	44	63	4,348
Western Reserve	"	126	134	9,125
Cincinnati	"	37	49	4,258
Indiana	Indiana	40	71	3,652
Illinois	Illinois	37	50	2,116
Peoria	"	41	40	2,101
Kentucky	Kentucky	10	12	815
Eastern Tennessee	Tennessee	50	82	6,213
Western Tennessee	Tennessee & Ala.	18	32	2,071
Michigan	Michigan	68	90	4,703
Missouri	Missouri	21	9	1,386
		1,251	1,369	118,992
	Licentiates	146		
		1,397		

This list does not include a number of Presbyteries, that had not reported at the period of the last triennial General Assembly. The general statistics of this connection may be estimated as follows:—19 Synods; 1,300 ministers; 200 Licentiates; 1,500 Churches; and 120,000 Communicants.

THEOLOGICAL SEMINARIES, WITH THE NUMBER OF STUDENTS.

New York City	90
Auburn, N. Y.	70
Hudson, Ohio	20
Lane, Cincinnati, Ohio	30
Maryville, Tenn.	25

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CUMBERLAND PRESBYTERIANS.

This connection embraces 1 General Assembly; 13 Synods; 60 Presbyteries; 500 Ministers; 175 Licentiates; 600 Churches, and 100,000 Communicants.

ASSOCIATE PRESBYTERIAN CHURCH.

(In England, "Original Secession Church.")

This connection embraces 1 Synod; 13 Presbyteries; 186 Ministers; 280 Churches; and 26,000 Communicants. The Theological Seminary is at Canonsburg, Pa. *Students*, 30.

ASSOCIATE REFORMED CHURCH.

The Associate Reformed Church, (in England "*United Secession Church*,) embraces 3 Synods; 165 Ministers; 300 Churches; 26,000 Communicants.

THEOLOGICAL SEMINARIES.

Location.	Principal.	Students.
Newburg, N. Y.		11
Allegheny City, Pa.	J. T. Presley, D. D.	19
Oxford, Ohio	J. Claybaugh, D. D.	

REFORMED PRESBYTERIAN CHURCH.

This church, the members of which, in England, are styled "*Covenanters*," embraces 2 Synods; 57 Ministers; 10 Licentiates; 94 Churches; and 10,500 Communicants.

The Theological Seminary of the Reformed Presbyterian Church is at Allegheny City, Pa. J. R. Wilson, D. D., *Principal*. *Students*, 15.

GERMAN REFORMED CHURCH.

This church embraces 2 Synods; 200 Ministers; 700 Churches; and 75,000 Communicants.

The Theological Seminary is at Mercersburg, Pa. *Principal*, J. W. Nevin, D. D. *Students*, 20.

METHODIST EPISCOPAL CHURCH.

The Methodist Episcopal Church embraces 1 General Conference; 32 State Conferences; 7 Bishops; 4,147 Itinerant, and 8,298 Local Preachers; and 1,157,249 Communicants.

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DUTCH REFORMED CHURCH.

Classes.	State.	Clerk.	Clergy.	Churches.	Communicants.
North New York	New York...	H. S. Marselus .	26	21	3,347
South New York	"	S. H. Meeker ..	7	7	1,251
North L. Island.	"	G. I. Garretson .	7	7	682
South L. Island.	"	R. O. Currie ...	10	10	836
Poughkeepsie ..	"	F. M. Kipp	14	14	1,948
Albany	"	T. Wycoff, D. D.	13	16	2,386
Rensselaer	"	N. N. Kittle ...	13	13	1,556
Ulster	"	C. L. Vandyke .	13	17	2,458
Washington ...	"	T. H. Pitcher ..	14	11	1,010
Montgomery ...	"	S. Van Vechten.	13	24	1,819
Schoharie	"	N. B. Chittenden	8	11	463
Schenectady...	"	A. T. Switz....	15	12	1,290
Cayuga	"	A. W. Rand....	16	19	1,284
Orange	"	T. B. Teneyk ..	18	15	1,685
Greene	"	W. Cahoon	6	9	834
Paramus	N. Y. and N. J.	C. S. Hayman..	13	13	1,602
New Brunswick	New Jersey .	A. A. Marselus.	26	17	2,178
Bergen	"	T. Garretson...	9	10	1,379
Passaic	"	Z. Wilson	8	9	766
Philadelphia ...	Pennsylvania	J. R. Talmadge.	13	13	2,258
Illinois	Illinois.....	G. G. Sill	5	7	81
Michigan	Michigan....	I. Dewitt.....	4	5	106
			271	279	31,214
22 Classes. 1 Synod.					

The Theological Seminary is located at New Brunswick, N. J. ———, *President*. *Students*, 36.

METHODIST PROTESTANT CHURCH.

The Methodist Protestant Church embraces 1 General Conference; 22 Conferences; 550 Itinerant, and 750 Local Preachers; 2,000 Churches; and 60,000 Communicants.

UNITED BRETHREN IN CHRIST.

(OTTERBEIN CONNECTION.)

This connection embraces 1 General Conference; 9 Conferences; 4 Bishops; 250 Itinerant, and 350 Local Preachers; 1,800 Churches; and 65,000 Communicants.

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EVANGELICAL LUTHERAN CHURCH.

Synod.	Form'd.	State.	President.	Clergy.	Ch's.
Germ. Synod of Pa.	1748	Pennsylvania ..	I. Miller, D. D....	65	210
Western Pa.....	1825	"	A. Lochman	41	111
Allegheny Synod .	1842	"	T. Martin	20	95
East. Pennsylvania	1842	"	I. P. Schindel, sen.	21	41
New York.....	1795	N. Y. & N. J. ..	H. A. Polman....	35	35
Hartwick Synod..	1830	New York.....	T. Lape.....	15	15
Frankean Synod .	1838	"	W. Van Alstine ..	30	40
Maryland	1820	Md. & D. C. ...	E. Keller.....	30	68
Germ. S. of E. Ohio	1821	Ohio	C.C.Schweizerbart	20	80
Germ. S. of W.Ohio	1831	"	A. Henkel.....	40	96
1st Eng. Sy. of Ohio	1836	"	J. N. Roof.....	8	30
2d Eng. Sy. of Ohio	1837	"	I. B. Reck	40	124
Synod of the West	1834	Illinois & Ky...	N. B. Littell	31	53
Eastern Virginia..	1830	Virginia	J. Davis.....	29	42
Western Virginia.	1842	"	J. Scherer	7	18
North Carolina ...	1800	North Carolina.	W. Arz	11	20
South Carolina ...	1824	SC. Ala, Miss., Geo. & La.	I. Bachman, D. D.	31	37
Indiana	1836	Indiana	.....	12	20
Tennessee	1820	Tennessee	.....	20	90
Michigan.....	1842	Michigan.....	.....	4	7
				501	1232

Vacant Congregations 250
Communicants 180,000

THEOLOGICAL SEMINARIES.

Location.	Principal.	Students.
Gettysburg, Pa.	S. S. Schmucker, D. D.	25
Columbus, Ohio	J. F. Winkler	5
Wooster, Ohio	E. Keller.	
Hartwick, N. Y.	W. Strobel, D. D.	5
Lexington, S. C.	E. Hazelius, D. D.	10

EVANGELICAL ASSOCIATION.

(ALLBRIGHT CONNECTION.)

This connection embraces 1 General Conference; 4 Conferences; 2 Bishops; 112 Itinerant, and 200 Local Preachers; 900 Churches; and 15,000 Communicants.

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SUMMARY OF THE PRINCIPAL RELIGIOUS DENOMINATIONS.

Denominations.	Ministers.	Churches.	Communicants.	Population under the influence of the respective denom.
1. EPISCOPAL—				
Protestant Episcopalians...	1,226	1,342	70,000	1,200,000
Roman Catholics.....	660	730	*80,000	1,300,000
Moravians, (*United Brethren*)	30	25	6,000	25,000
2. CONGREGATIONAL—				
Orthodox Congregationalists	1,350	1,500	180,000	
Unitarians	200	300	*30,000	
Universalists	646	990	*100,000	*1,500,000
Christ-ians,(*Christ-ian Connection*)	2,000	1,500	325,000	
3. BAPTISTS—				
Regular Baptists	6,377	9,230	707,942	
Freewill Baptists.....	921	1,165	61,372	
Seventh Day Baptists	70	60	6,000	
Reformed Baptists or Discip. of Christ, (*Campbellites*).	1,500	2,000	200,000	4,000,000
Six Principle Baptists.....	22	17	3,000	
Winebrennarians.....	100	300	15,000	
4. PRESBYTERIAN—				
Regular Presbyterians,(*OS*)	1,715	2,153	157,477	
Do. do. (*N.S.*)	1,500	1,500	120,000	
Cumberland Presbyterians .	675	600	100,000	
Associate Presbyterians ...	186	280	26,000	
Associate Reformed	165	300	26,000	4,500,000
Reformed Presbyterians ...	67	94	10,500	
Dutch Reformed	271	279	31,214	
German Reformed.....	200	700	75,000	
Evangelical Lutheran.....	501	1,482	180,000	
5. METHODISTS—				
Methodist Episcopal Church	12,443		1,157,249	
Protestant Methodists.....	1,300	2,000	60,000	
Welsh Calvinist Methodists	20	20	2,500	
Wesleyan Methodists	600		20,000	
Reformed Methodists	75		3,000	5,000,000
United Brethren in Christ, (*Otterbein Connection*) .	600	2,000	65,000	
Evangelical Association, (*Allbright Connection*)..	312	900	15,000	
MENNONITES	240	400	60,000	
NEW JERUSALEM CHURCH, (*Swedenborgians*)	45	42	5,000	
FRIENDS, OR QUAKERS, about		500		
JEWS				50,000

* Estimated.

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THE INDIVIDUAL STATES.

(*For a view of the Products of the various States, as officially estimated, see pages* 76, 77.)

(*For a statement of their Commerce, see pages* 88, 92.)

(*For a statement of their Population in* 1840, *see page* 64.)

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GOVERNORS OF THE SEVERAL

WITH THEIR SALARIES, TERMS OF OFFICE, AND

THE NUMBER OF SENATORS AND REPRE-

WITH THEIR RE-

States.	Governors.	Salary.	Gov. Term years.	Term expires.	Senators.	Term years.	Representatives.
Maine,	Hugh J. Anderson,.....	$1,500	1	Jan. 1846	25	1	151
N. H.	John H. Steele,.....	1,000	1	June, 1845	12	1	240
Vt.	John Mattocks,.....	750	1	Oct. 1844	30	1	231
	William Slade,.....			Oct. 1845			
Mass.	George N. Briggs, ...	2,500	1	Jan. 1845	40	1	356
R. I.	James Fenner, ...	400	1	May, 1845	31	1	69
Conn.	Roger S. Baldwin,	1,100	1	May, 1845	21	1	215
N. Y.	Wm. C. Bouck,.....	4,000	2	Jan. 1845	32	4	128
N. J.	Daniel Haines,.....	2,000	3	Jan. 1845	19	3	58
Penn.	David R. Porter,.....	4,000	3	Jan. 1845	33	3	100
Del.	William B. Cooper, ...	1,333⅓	4	Jan. 1845	9	4	21
Md.	Francis Thomas, ...	4,200	3	Jan. 1845	21	6	78
Va.	James McDowell,.....	3,333⅓	3	Mar. 1846	32	4	134
N. C.	J. M. Morehead,.....	2,000	2	Jan. 1845	50	2	120
	William A. Graham, ...			Jan. 1847			
S. C.	James H. Hammond, ...	3,500	2	Dec. 1844	45	4	124
Ga.	George W. Crawford, ..	4,000	2	Nov. 1845	93	1	207
Ala.	Benj. Fitzpatrick,.....	2,500	2	Dec. 1845	33	3	100
Miss.	Albert G. Brown, ...	3,000	2	Jan. 1846	32	4	100
La.	Alexander Mouton, ...	6,000	4	Jan. 1847	17	4	60
Ark.	Samuel Adams, (*acting*,)	2,000	4	Nov. 1844	21	4	66
Tenn.	James C. Jones,.....	2,000	2	Oct. 1845	25	2	75
Ken.	William Owsley, ...	2,500	4	Sept. 1848	38	4	100
Ohio,	T. W. Bartley, (*acting*,)	1,500	2	Dec. 1844	36	2	72
Mich.	John S. Barry,.....	1,500	2	Jan. 1846	18	2	53
Ind.	James Whitcomb,.....	1,500	3	Dec. 1846	50	3	100
Ill.	Thos. Ford,.....	2,000	4	Dec. 1846	39	4	102
Mo.	M. M. Marmaduke, (*act.*)	2,000	4	Nov. 1844	33	4	100
	John C. Edwards,.....			Nov. 1848			
Territories.							
Flor.	John Branch, ...	2,500	3	Aug. 1847	15	2	29
Wisk.	Nathaniel P. Tallmadge,	2,500	3	Sept. 1847	13	4	26
Iowa,	John Chambers, ...	2,500	3	July, 1847	13	2	26

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STATES AND TERRITORIES,

EXPIRATION OF THEIR RESPECTIVE TERMS;

SENTATIVES IN THE STATE LEGISLATURES,

SPECTIVE TERMS.

Term-years.	Seats of Government.	Times of Holding Elections.	Times of the Meeting of the Legislatures.
1	Augusta, ...	2d Monday in Sept.	1st Wednesday in Jan.
1	Concord, ...	2d Tuesday in Mar.	1st Wednesday in June.
1	Montpelier, ...	1st Tuesday in Sept.	2d Thursday in October.
1	Boston, ...	2d Monday in Nov.	1st Wednesday in Jan.
1	Prov.&Newport,	Gov. & Sen. in Apr. Rep. in Ap. & Aug.	1st Wed. in May & in June, last Wed. in Oct. & in Jan.
1	Hart. & N. Haven,	1st Monday in April.	1st Wednesday in May.
1	Albany, ...	Tues. af 1st Mon. Nov.	1st Tuesday in January.
1	Trenton, ...	2d Tuesday in Oct.	2d Tuesday in January.
1	Harrisburg, ...	2d Tuesday in Oct.	1st Tuesday in January.
2	Dover, ...	2d Tuesday in Nov.	1st Tuesday in Jan. bienn.
1	Annapolis, ...	1st Wednes. in Oct.	last Monday in December.
1	Richmond, ...	4th Thursday in Apr.	1st Monday in December.
1	Raleigh, ...	1st Thursday in Aug.	3d Monday in Nov. bienn.
2	Columbia, ...	2d Monday in Oct.	4th Monday in November.
1	Milledgeville, ...	1st Monday in Oct.	1st Monday in November.
1	Tuscaloosa, ...	1st Monday in Aug.	1st Monday in November.
2	Jackson, ...	1st Mon. & Tu. Nov.	1st Monday in Jan. bienn.
2	New Orleans, ...	1st Monday in July,	1st Monday in January.
2	Little Rock, ...	1st Monday in Oct.	2d Monday in Nov. bienn.
2	Nashville, ...	1st Thursday in Aug.	1st Monday in Oct. bienn.
1	Frankfort, ...	1st Monday in Aug.	1st Monday in December.
1	Columbus, ...	2d Tuesday in Oct.	1st Monday in December.
1	Detroit, ...	1st Monday in Nov.	1st Monday in January.
1	Indianapolis, ...	1st Monday in Aug.	1st Monday in December.
2	Springfield, ...	1st Monday in Aug.	1st Monday in Dec. bienn.
2	Jefferson City, ...	1st Monday in Aug.	4th Monday in Nov. bienn.
1	Tallahassee, ...	2d Monday in Oct.	1st Monday in January.
2	Madison, ...	4th Monday in Sept.	
1	Iowa City, ...		1st Monday in December.

In all the States, except Virginia and South Carolina, the Governor is voted for by the people; and if no one has a majority of all the votes, in the six Eastern States, in which such a majority is required, the Legislature elect to the office of Governor, one of the candidates voted for by the people.

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MAINE.

The Governor is elected by the people, and holds his office one year, from the first Wednesday of January. He must be thirty years of age at the commencement of his term, and a natural born citizen of the United States.

The Council

Consists of seven persons, citizens of the United States, and residents of the State, to advise the Governor in the Executive Department of the Government, whom the Governor has full power to assemble at his discretion. The Counsellors are chosen annually on the first Wednesday of January, by joint ballot of the Senators and House of Representatives in convention. Vacancies are filled in the same manner.

The Legislative Power

Consists of a Senate and House of Representatives.

The Senate

Consists of 25 members, elected annually by the qualified electors of the districts into which the State from time to time shall be divided. They must be twenty-five years of age at the commencement of their term of office, and five years residents of the State previous to their election.

The House of Representatives

Consists of 151 members, elected by the qualified electors for one year. No person can be a member of the House of Representatives unless he shall have been five years a citizen of the United States, and have arrived at the age of twenty-one years. He must have been a resident of the State one year, or from the adoption of the Constitution; and for the three months next preceding the time of his election, and during the period for which he is elected, must be a resident in the town or district which he represents.

The Judiciary Power

Is vested in a Supreme Judicial Court, and such other courts as the Legislature shall from time to time establish. All judicial officers hold their office during good behaviour, but not beyond the age of seventy years. It is the duty of the Governor to nominate, and with the advice and consent of the Senate, appoint all judicial officers, the Attorney-General, the Sheriffs, Coroners, Registers of Probate, and Notaries Public.

The Secretary of State and Treasurer

Are elected annually by the Senate and House in joint ballot.

The Right of Suffrage

Is granted to every male citizen of the United States of the age of twenty-one years and upwards, excepting paupers, persons under guar-

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dianship, and Indians not taxed,) having his residence established in the State for the term of three months next preceding any election. The election must be by written ballot.

	Salary.
Governor, HUGH J. ANDERSON,	$1,500
Secretary of State, Philip C. Johnson,	900
Treasurer, James White,	900
Speaker of the Senate, John W. Dana, (1844.)	
Speaker of the House of Representatives, David Dunn, (1844.)	

SUPREME JUDICIAL COURT.

Chief Justice,	Ezekiel Whitman,	of Portland,	$1,800
Associate do.	John S. Tenney,	" Norridgwock,	1,800
" do.	Ether Shepley,	" Portland,	1,800
Attorney-General,	Otis L. Bridges,	" Calais,	1,000
Reporter,	John Shepley,	" Saco,	1,000

DISTRICT COURTS.

Eastern District, Judge,	F. H. Allen,	of Bangor,	1,200
do. do. do.	A. G. Chandler,	" Calais,	1,200
Middle do. do.	A. Redington, Jr.,	" Augusta,	1,200
Western do. do.	Daniel Goodenow,	" Alfred,	1,200

BANKS.

The following are the returns of the Maine Banks, June 3d, 1844:

LIABILITIES.

Capital stock paid in	$3,009,000 00
Bills in circulation	1,602,327 00
Net profits on hand	117,342 78
Balances due other Banks	76,793 06
Cash deposited, &c., not bearing interest	887,170 34
Cash deposited bearing interest,	143,381 69
Total amount due from the banks	5,836,014 87

RESOURCES.

Gold, silver, &c. in banks	$224,106 85
Real Estate	254,055 80
Bills of banks in this State	83,823 72
Bills of banks elsewhere	55,317 60
Balances due from other banks	551,986 65
Due to the banks, except balances	4,666,503 45
Total amount of the resources of the banks	5,836,014 07

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NEW HAMPSHIRE.

The Governor is elected annually by the people on the second Tuesday in March. The qualifications necessary to render a candidate eligible to this office are a residence in the State during seven years immediately preceding the election, the age of thirty years, and property to the amount of five hundred pounds, one-half consisting of a freehold within the State, held in the candidate's own right.

The Council

Consists of five members, elected by the freeholders and other inhabitants qualified to vote for Senators. The qualifications requisite in a candidate for the office of Councillor are, a residence of seven years within the State, a residence within the county at the time of the election, property within the State to the amount of five hundred pounds, and thirty years of age.

The Legislative Power

Is vested in a Senate and House of Representatives, each of which bodies has a negative upon the acts of the other. This joint Legislature is styled the General Court of New Hampshire. It assembles annually on the first Wednesday in June.

The Senate

Contains twelve members, elected annually by the people. To be eligible as a Senator, the candidate must have been an inhabitant of the State for seven years immediately preceding the election, he must be at least thirty years of age, and must possess freehold property within the State to the amount of two hundred pounds.

The House of Representatives

Contains 250 members, elected annually by the people. The qualifications required of a candidate for membership of the House are a residence within the State for two years immediately preceding the election, thirty years of age, and property to the amount of one hundred pounds, within the district which he intends to represent, one-half of this property being a freehold. On ceasing to be thus qualified he also ceases to be a Representative.

The Judiciary Power.

All Judical officers, the Attorney-General, Solicitors, Sheriffs, Coroners, Registers of Probate, are nominated and appointed by the Governor and Council, and hold their offices during good behaviour. At the representation of both houses of the Legislature, the Governor, with the consent of Council, may make removals at any time. No person can hold the office of Judge in any court, Judge of Probate, or Sheriff of any county, after he has attained the age of seventy years.

The Secretary and Treasurer

Are chosen by joint ballot of the Senators and Representatives assembled in one room.

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Right of Suffrage.

Every male inhabitant of twenty-one years of age and upwards, excepting paupers and persons excused from paying taxes at their own request, is entitled to vote.

	Salary.
Governor, John H. Steele,	$1,000
Secretary of State, Thomas P. Treadwell,	800
Treasurer, John Atwood,	600
Commissary General, Sampson B. Lord,	400

President of the Senate, Timothy Hoskins.
Speaker of the House of Representatives, Harry Hibbard.

Superior Court.

Chief Justice, Joel Parker,	$1,400
Associate do. Andrew S. Woods,	1,200
do. do. John J. Gilchrist,	1,200
Attorney-General, Lyman B. Walker,	1,200

The Superior Court holds one term annually in each county of the State, and for certain purposes is vested with Chancery jurisdiction.

BANKS.

Abstract of the leading items of the returns of the Banks of New Hampshire, June 3, 1844.

LIABILITIES.

Capital stock	$2,008,298
Bills in circulation	1,021,914
Deposites	394,778
Total	$3,424,990

Assets.

Real Estate	$60,399
Total amount of debts due banks	2,760,009
Specie	137,252
Bills of other banks and treasury notes	75,830
Deposites in other banks for redemption of bills	400,523
Total	$4,434,014

MASSACHUSETTS.

The Governor

Is elected annually by the people on the second Monday of November. No person is eligible to this office unless at the time of his election he shall have been an inhabitant of the State for seven years next preceding, be possessed of a freehold within the State of one thousand pounds, and shall declare himself to be of the Christian religion.

The Lieutenant-Governor

Is elected annually by the people, and must possess the same qualifications as the Governor in point of religion, property and residence. In case of death, or absence from the Commonwealth, of the Governor, he for the time being performs the duties incumbent upon the Governor.

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The Council

Consists of nine persons, besides the Lieutenant-Governor, who are elected annually by joint ballot of the Senate and House of Representatives assembled in one room, from among the Councillors and Senators returned by the election of the people. Not more than two Counsellors can be chosen out of any one district. They rank in civil arrangement next after the Lieutenant-Governor.

The Legislative Power

Consists of a Senate and House of Representatives, styled the General Court of Massachusetts. These bodies assemble at Boston on the first Wednesday of January annually.

The Senate

Contains forty members, elected annually by the people. No person is eligible to the Senate, unless he possess a freehold of three hundred pounds, a personal estate to the value of six hundred pounds, or of both to the amount of the same sum, and who has not been an inhabitant of the Commonwealth five years immediately preceding his election.

The House of Representatives

Contains 356 members, which are elected annually by the people. No person is eligible to the House who is not possessed of a freehold of the value of one hundred pounds, within the town he shall be chosen to represent, or rateable estate, to the value of two hundred pounds, and shall cease to represent the said town immediately on his ceasing to be qualified as above.

The Judicial Power.

All Judicial officers, the Attorney-General, the Solicitor-General, all Sheriffs, Coroners, and Registers of Probate, are nominated and appointed by the Governor, by and with the advice and consent of the Council, and hold their offices during good behaviour. At the representation of both houses of the Legislature, the Governor, with the consent of the Council, may at any time remove them.

Secretary, Treasurer, &c.

The Secretary, Treasurer, and Receiver-General, are chosen annually by joint ballot of the Senate and Representatives.

Right of Suffrage.

Every male citizen of twenty-one years and upwards (excepting paupers and persons under guardianship) who has resided in the Commonwealth one year, and within the town or district in which he may claim a right to vote six months next preceding any State election, and shall have paid any tax in the Commonwealth within two years, or shall have been exempted from taxation, is entitled to vote.

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MASSACHUSETTS.

OFFICES.	NAMES OF OFFICERS AND RESIDENCE.	Salary per annum
Governor,	GEORGE N. BRIGGS, of Pittsfield	2,500
Lieutenant-Governor,	John Reed, " Yarmouth, double pay of Councillor.	
Secretary,	John G. Palfrey, " Cambridge	1 600
Treasurer,	Thomas Russell, " Plymouth	1,600
Chief Justice Sup. Jud. Court,	Lemuel Shaw, " Boston	3,500
Justice " " "	Samuel S. Wilde, " "	3,000
" " " "	Charles A. Dewey, " Northampton	3,000
" " " "	Samuel Hubbard, " Boston	3,000
Chief Justice Court of C. Pleas,	Daniel Wells, " Greenfield	1,800
Justice " " "	Joshua H. Ward, " Salem	1,700
" " " "	Emery Washburn, " Worcester	1,700
" " " "	Charles Allen, " Worcester,	1,700
" " " "	Pliny Merrick, " "	1,700
Attorney for Suffolk County,	Samuel D. Parker, " Boston,	1,500
Dist. Attorney Northern Dist.,	Asahel Huntington, " Salem,	700
" " Southern "	John H. Clifford, " New Bedford,	700
" " Middle "	Ezra Wilkinson, " Dedham,	700
" " Western "		700
Reporter to Sup. Jud. Court,	Theron Metcalf, " Dedham,	300
JUDGES OF PROBATE COURTS.		
Counties—Suffolk,	Willard Phillips, of Boston,	800
Essex,	Daniel A. White, " Salem,	600
Middlesex,	Samuel P. P. Fay, " Cambridge,	700
Worcester,	Ira M. Barton, " Worcester,	600
Hampshire,	Ithamar Conkey, " Amherst,	240
Hampden,	Oliver B. Morris, " Springfield,	240
Franklin,	Richard E. Newcombe, " Greenfield,	240
Berkshire,	William P. Walker, " Lenox,	375
Norfolk,	Sherman Leland, " Roxbury,	400
Plymouth,	Wilkes Wood, " Middleborough,	350
Bristol,	Oliver Prescott, " New Bedford,	400
Barnstable,	Nymphas Marston, " Barnstable,	300
Nantucket,	Samuel Mitchell, " Nantucket,	150
Dukes,	Theodore G. Mayhew, " Edgartown,	100
REGISTER OF PROBATE COURTS.		
Counties—Suffolk,	Horatio M. Willis, of Boston,	1,500
Essex,	Nathaniel Lord, " Ipswich,	1,200
Middlesex,	Isaac Fiske, " Weston,	1,200
Worcester,	Charles G. Prentiss, " Worcester,	1,200
Hampshire,	Samuel F. Lyman, " Northampton,	400
Hampden,	Justice Willard, " Springfield,	400
Franklin,	George Grennell, " Greenfield,	400
Berkshire,	Henry W. Bishop, " Lenox,	500
Norfolk,	Jonathan H. Cobb, " Dedham,	600
Plymouth,	Jacob H. Loud, " Plymouth,	600
Bristol,	Anselm Bassett, " Taunton,	600
Barnstable,	Timothy Reed, " Barnstable,	400
Nantucket,	George Cobb, " Nantucket,	250
Dukes,	Barnard C. Marchant, " Edgartown,	100
Adjutant-General and Keeper of the Public Stores, &c.,	Henry K. Oliver, " Salem,	1,200 / 300
Sec. of the Board of Education,	Horace Mann, " Boston,	1,500
Land Agent,	George W. Coffin, " "	1,000
First Clerk Secretary's Office,	William Tufts, " "	1,000
Second " " "	Charles W. Lovett, " "	800
First " Treasurer's Office,	Joseph Foster, " "	1,000
Second " " "	David Wilder, Jr. " "	800
Serjeant at Arms,	Benjamin Stevens, " "	1,000
Messenger to the Governor and Council,	Cyrus Chase, " Boston,	500
Watchman to the State House,	Edmund S. Brigham, " "	600
Assistant " " "	George Sargent, " "	450
" " " "	William G. Stoddard, " "	450
Superintendent State Lunatic Hospital,	Samuel B. Woodward, " Worcester,	1,800
Assistant Physician, " "	John R. Lee, " "	700
Steward, " "	Charles P. Hitchcock, " "	700

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President of the Senate, Josiah Quincy, Jr., Boston,.....	Double pay of members. Attendance during the session.
Speaker of the House of Representatives, Samuel H. Walley, Jr., Roxbury,	
Clerk of the Senate, Charles Calhoun, Boston, $6 per day,.....	
" " House of Reps., Charles W. Storey, Jr., Roxbury, $8 per day,	
Assistant Clerk of the Senate, Washington P. Gregg, Boston, $5 per day,	

The pay of the members of the Council, Senate, and House of Representatives, is $2 per day during the sessions.

FINANCES OF THE CITY OF BOSTON, FROM MAY 1, 1843, TO MAY 1, 1844.

(From the Annual Report.)

Receipts—		
Taxes	$695,022	
Lands, &c.....	79,481	
Rents	52,498	
Other sources	339,030	
		$1,166,031
Expenditures		952,526
Surplus		$213,505
Balance in City and County Treasury		$181,482
Amount of City Debt, May 1, 1844...		$1,423,800

OFFICIAL CITY VALUATION OF PROPERTY.

	1842.	1843.
Real	$65,499,900	$67,673,400
Personal	41,223,800	42,372,600
	$106,723,700	$110,046,000
		106,723,700
Increase.....		$3,322,300

STATISTICS OF MANUFACTURES OF LOWELL, (MASS.,) JANUARY 1, 1844.

(Compiled from authentic sources.)

Capital stock of the various Associations.....	$10,650,000
Number of mills, (exclusive of print works,)	33
Spindles	201,076
Looms	6,194
Females employed	6,295

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Males employed	2,345
Yards made per week	1,425,800
Bales of cotton used in do.	1,120
Pounds of cotton wrought in do.	440,600
Yards dyed and printed do.	273,000
Tons of anthracite coal per annum	12,500
Cords of wood " "	3,290
Gallons of oil " "	67,849
Yards of cloth " "	74,141,600
Pounds of cotton consumed	22,880,000
Assuming half to be Upland, and half New Orleans and Alabama, the consumption in bales, 361 lbs. each, is	58,240
A pound of cotton averages 3 1-5 yards.	
100 lbs. cotton will produce 89 lbs. cloth.	
Average wages of females, clear of board, per week	$1.75
Average wages of males, clear of board, per day	70
Medium produce of a loom, No. 14 yarn, yards per day,	44 to 45
" " " " No. 30 " " "	30
Average per spindle, yards per day	1 1-10
" amount of wages paid per month	$150,000
Consumption of starch per annum, (lbs.)	800,000
Consumption of flour for starch in mills, print works, and bleachery, bbls. per annum	4,000
Consumption of charcoal, bushels per annum	600,000

The Locks and Canals' Machine Shop, included among the 33 mills, can furnish machinery complete for a mill of 5000 spindles in four months; and lumber and materials are always at command, with which to build or rebuild a mill in that time, if required. When building mills, the Locks and Canals Company employ directly and indirectly from 1,000 to 1,200 hands.

To the above total may be added the Lowell Water-Proofing Company, connected with the Middlesex Manufacturing Company; the extensive powder mills of O. M. Whipple, Esq.; the Lowell Bleachery, with a capital of $50,000; flannel mill, blanket mill, batting mill, paper mill, card and whip factory, planing machine, reed machine, foundry, grist and saw mills—together employing about 500 hands, and a capital of $500,000.

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RHODE ISLAND.

Any duly qualified elector in this State, not holding office under the Government of the United States, is eligible to any civil office therein.

The Executive Power.

A Governor, a Lieutenant-Governor, a Secretary of State, an Attorney-General, and a General Treasurer, are elected annually by the people on the first Wednesday in April.

The Governor.

The chief Executive power of the State is vested in the Governor.

The Lieutenant-Governor

Acts as Governor in case of a vacancy in the office, or the inability of this officer to serve, &c.

The Legislative Power

Is vested in a Senate and House of Representatives, collectively styled the General Assembly; and when acting conjointly, the Grand Committee. The General Assembly holds two sessions annually, one at Newport on the last Monday of October,—the other biennially at South Kingstown, and, in the intermediate years, at Bristol and East Greenwich alternately. An adjournment of the October session is held annually at Providence.

The Senate

Consists of the Lieutenant-Governor, and one Senator from each town or city in the State. The Governor, or in his absence, the Lieutenant-Governor presides, and votes in case of equal division. The Secretary of State is also Secretary of the Senate, and presides in the absence of the Governor and Lieutenant-Governor, until an election of a presiding officer is made by the Senate.

The House of Representatives

Is limited to seventy-two members. Each town or city is entitled to at least one member, provided that no town or city shall elect more than one-sixth of the entire number. The present ratio of representation is that of one member to every 1530 inhabitants; and the election being general in each town or city, each fraction exceeding a moiety is entitled to one representative. The House at present consists of sixty-nine members.

The Judicial Power

Consists of one Supreme Court, and such Inferior Courts as the General Assembly may ordain. The Judges of the Supreme Court are elected by the General Assembly in Grand Committee, and may be dismissed by a majority of all the members elect of each house separately.

Right of Suffrage.

The requisites for the general franchise are, male citizenship of the United States; the age of twenty-one years; residence and home in the State for one year, and in the town or city where the vote is offered for six months next preceding the election; and real estate in the said town or city of the value of one hundred and thirty-four dollars or renting for seven dollars above all incumbrances whatsoever, whether held in fee-simple, fee-tail for life, or in reversion or remainder, the conveyance of which, if by deed, has

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been recorded at least ninety days; provided the said estate entitles no other person to vote. If the voter, otherwise qualified, own such an estate in any town or city within the State other than that in which he resides, he is required to produce a certificate to that effect from the clerk of the town or city in which his estate lies, dated within ten days of the time of voting, and showing that the deed, if there be any, has been recorded ninety days.

The right of voting under the following restrictions is extended to every male native of the United States, twenty-one years of age, resident for two years in the State, and for six months in the town or city where his vote is offered, whose name has been legally enrolled in the said town or city during the calender year next preceding that of the election, and who produces legal proof that he has paid within the said year a tax of one dollar assessed within any town or city in the State, or that he has been enrolled and has actually performed duty in any military company of the State.

Restrictions.—No person can vote in the election of the Town Council of the city of Providence, or upon any proposition for the expenditure of money in any town or city, unless he has paid, within the year next preceding, a tax upon his property therein, valued at least at one hundred and thirty-four dollars.

Legal residence is not obtainable by dwelling in any garrison, barrack, or military or naval station within the State.

Paupers, lunatics, persons *non compos mentis*, persons under guardianship, and Narraganset Indians, are disfranchised.

		Salary.
Governor,	James Fenner,	$400
Lieutenant Governor,	Byron Diman,	200
Secretary of State,	Henry Bowen,	fees and 750
Treasurer,	Stephen Cahoone,	fees and 650
Attorney-General,	Joseph M. Blake,	fees.

SUPREME COURT.

Chief Justice,	Job Durfee,	$650
Associate "	Levi Haile,	550
" "	William R. Staples,	550
" "	George A. Brayton,	550

The Supreme Court also receive entries on petitions for the Insolvent Act. The Justices of this Court also preside alternately as Chief of the Common Pleas in the several counties, for which they receive a proportion of the entries.

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CONNECTICUT.

The Governor

Is elected annually by the people on the first Monday of April. No person is eligible to this office unless he is an Elector of the State, and shall have arrived at the age of thirty years.

The Lieutenant Governor

Is elected at the same time, and holds his office one year; he exercises the power and authority of Governor, in case of death, resignation, refusal to serve, impeachment, or absence of that officer.

The Legislative Power

Is vested in two distinct branches or powers, the Senate and House of Representatives, which are styled the General Assembly. These bodies are elected also on the first Monday of April.

The Senate

Contains twenty-one members, who are elected annually.

The House of Representatives

Contains 215 members, who are elected annually. The General Assembly meets annually, alternately at Hartford and New Haven, on the first Wednesday of May. The session of 1845 will be holden at Hartford

The Judicial Power.

The Judges of the Supreme Court of Errors, and of the Superior and Inferior Courts, are appointed by the General Assembly, and hold their offices during good behaviour, but not beyond the age of seventy years. All other Judges and Justices of the Peace are appointed annually.

Treasurer, Secretary, Comptroller, &c.

The Treasurer, Secretary, and Comptroller of Public Accounts, are elected annually by the people at the same time as the election of the abovenamed officers.

A Sheriff is appointed for each county, by the General Assembly, who holds his office three years.

Right of Suffrage.

Every white male citizen of the United States, who shall have gained a settlement in the State, attained the age of twenty-one years, resided in the town in which he offers his vote six months preceding, and shall possess a freehold estate of the yearly value of seven dollars in the State, or shall have performed or been excused from performing military duty, or shall have paid a State tax within a year, and shall sustain a good moral character, shall, on his taking the oath of allegiance, be an elector.

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CONNECTICUT.

	Salary.
Governor, ROGER S. BALDWIN,	$1,100
Lieutenant-Governor and President of Senate, Reuben Booth,	300
Secretary, Daniel P. Tyler, fees and	84
Treasurer, Joseph B. Gilbert,	1,000
Comptroller, Abijah Carrington,	1,000
Speaker of the House, Charles J. M'Curdy.	
Clerk of the Senate, Nelson White.	
Clerk of the House, Lucius G. Peck.	

SUPREME COURT.

Chief Justice,	Thomas S. Williams,	Hartford,	$1,100
Associate do.	Samuel Church,	Salisbury,	1,050
do. do.	Joel Hinman,	Waterbury,	1,050
do. do.	Henry M. Waite,	Lyme,	1,050
do. do.	William L. Storrs,	Middletown,	1,050
Reporter,	Thomas Day,	Hartford,	350

PUBLIC SCHOOLS.

The School Fund of this State is invested in bonds, contracts, mortgages, bank stock, and other property yielding dividends, and amounts to $2,051,423 77

Dividend during the year ending May 1, 1844 ..... 117,717 60

Being $1.40 for each scholar between the ages of four and sixteen, (in addition to the income of the deposite fund appropriated to this object, in the several towns.)

BANKS. (APRIL, 1844.)

The discounts of the banks in Connecticut advanced more than three-fourths of a million, and the circulation $691,711, in the months of February and March last, and the Bank Commissioners think they have in all probability reached a higher point than they have attained since March, 1839. The amount of circulation, balances with banks and agents or brokers in New York City alone, and the amount of bills discounted, has been ascertained with as great precision as possible at four periods during the year, and are as follows:

	Circulation.	Due from Banks and Brokers in N. Y.	Bills discounted.
August 13, 1843	$2,712,542	$1,486,126	$9,539,246
November 25, 1843	2,875,400	1,221,053	10,060,735
January 27, 1844	2,936,858	1,197,286	10,103,514
April 1, 1844	3,628,569	1,172,344	10,913,205

There has been an increase in the circulation during the year, of about $1,200,000, and of resources $1,500,000. The liabilities of bank directors are very much reduced in all the banks, and the aggregate amount is trifling when compared with previous exhibits.

The whole banking capital in the State is $8,292,233—of this amount nearly half is located in Hartford.

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VERMONT.

The Governor is elected annually by the people. No person is eligible to this office unless he is a citizen of the United States, and has resided in the State four years next preceding his election.

The Lieutenant-Governor is also elected annually by the people, and must possess the same qualifications as the Governor. He acts as Governor in the event of that officer's absence or inability to serve. As Lieutenant-Governor, he is President of the Senate.

The Supreme Executive Council

Consists of the Governor, Lieutenant-Governor, and twelve persons chosen by the people.

The Legislative Power

Is vested in a Senate and House of Representatives, which together are styled the General Assembly.

The Senate

Consists of thirty members, each county choosing at least one. Some counties are entitled to more, according to the amount of population.

The House of Representatives

Consists of two hundred and thirty-one members, elected annually by the people. Every representative must have resided in the State two years, the latter in the town for which he is elected, and must be a citizen of the United States.

The Judicial Power.

Courts of Justice are maintained in every county. There is a Supreme Court consisting of five Judges, who are Justices of the Peace throughout the State. All the Judges and Justices are elected annually by the Legislature. The Supreme Court sits once, and the County Courts twice in each county. There is also a Court of Chancery, which holds its sessions every year in each county. Each Judge of the Supreme Court being Chancellor of a Circuit.

Secretary, Treasurer, &c.

The Secretary of State is elected by the joint vote of the General Assembly annually; the Treasurer by the people, also annually.

Right of Suffrage.

Every man of the age of twenty-one years, a citizen of the United States, having resided in the State one year next preceding the election, and being of a quiet and peaceful behaviour, if he will take an oath or affirmation of allegiance, is entitled to all the privileges of a freeman.

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Council of Censors.

Once in seven years, a Council of Censors is elected for the term of one year. It is their duty to inquire whether the Constitution has been preserved inviolate during the last septenary; and whether the Legislative and Executive branches have performed their duty as guardians of the people, or have assumed or exercised other or greater powers than those conferred upon them by the Constitution; also to supervise various other matters connected with the administration of the State Government. The last election of Council of Censors took place on the last Wednesday of March, 1841, and was composed of the following named persons, thirteen in number:

Heman Allen,	Alvah R. French,	Ephraim Paddock,
Austin Birchard,	David Hibbard,	John A. Pratt,
Luther Carpenter,	Willis Mott,	Hezekiah H. Reed,
Martin C. Deming,	Gordon Newell,	Peter Starr.
J. D. Farnsworth.		

	Salary.
Governor, William Slade,	$750
Lieutenant Governor, Horace Eaton, as President of Senate,	$4 a day.
Secretary of State, James M'M. Shafter,	275
Treasurer, John Spalding,	500
Auditor, David Pierce, ($1.50 per day in session)	150

The compensation of the members of the General Assembly is $1.50 per day during session.

Supreme Court.

		Salary.
Chief Justice,	Charles K. Williams,	$1,375
Associate Judge,	Stephen Royce,	1,375
do. do.	Isaac F. Redfield,	1,375
do. do.	William Hebard,	1,375
do. do.	Milo L. Bennett,	1,375
Reporter,	William Weston,	450

The annual expenses of the State are about $80,000, which are paid by a direct tax.

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NEW YORK.

The Governor

Is elected biennially. No person is eligible to the office unless a native born citizen of the United States, and a freeholder. A residence of five years within the State, and the age of thirty years, are also requisite.

The Lieutenant-Governor

Is elected biennially; the qualifications for office are also similar. In case of the impeachment, removal, death or resignation of the Governor, or his absence from the State, his powers and duties devolve upon the Lieutenant-Governor. The latter is President of the Senate, but has only a casting vote therein.

The Legislative Power

Consists of a Senate and Assembly.

The Senate

Is composed of thirty-two members, who are chosen for four years, and must be freeholders. The Senate is divided into eight Senatorial districts, each entitled to four Senators, one of whom is elected annually.

The Assembly

Consists of one hundred and twenty-eight members, elected annually.

Judiciary Power.

The Governor nominates all Judicial officers, except Justices of the Peace, by message in writing, and holds the power of appointment with the consent of the Senate. Persons thus appointed hold their offices during good behaviour, or until the age of sixty years.

Secretary of State, Comptroller, &c.

The manner of appointing the Secretary of State, Comptroller, Treasurer, Attorney-General, and Surveyor-General, is as follows: — The Senate and Assembly each openly nominate one person for each of the said offices respectively; after which, these two bodies meet in conference; if they agree in their nomination, the nominees are appointed. In case of disagreement, the appointments are made by joint ballot. The term of office is three years, except in the case of the Treasurer, who is appointed annually.

The Right of Suffrage

Is extended to every white male citizen of the age of twenty-one years, who has been an inhabitant of the State one year, and of the county six months, next preceding the election, and has paid a county or State tax within the year, or is by law exempt from taxation, or has done military duty, or is exempt from such duty in consequence of being

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a fireman. No man of colour is entitled to vote unless he has been a resident of the State for three years preceding the election, and has possessed a freehold of the value of two hundred and fifty dollars for one year preceding the election, upon which a tax has been paid.

Court of Errors

Consists of the President of the Senate, the Senators, Chancellor and Justices of the Supreme Court.

Court of Chancery

Consists of a Chancellor and inferior officers. The former holds his office during good behaviour, or until he arrives at the age of sixty years.

		Salary.
Governor, William C. Bouck,		$4,000

Lieutenant-Governor and President of the Senate,
Daniel S. Dickinson, $6 per day during session of Legislature.

		Salary.
Comptroller,	Azariah C. Flagg,	2,500
Deputy do.	Philip Phelps,	1,500
Sec. State and Sup. Com. Schools,	Samuel Young,	2,500
Dep. Sec. State & Deputy Sup. Common Schools,	Samuel S. Randall,	1,000
Deputy Secretary of State,	Archibald Campbell,	1,500
Surveyor-General,	Nathaniel Jones,	1,000
Treasurer,	Thomas Farrington,	1,500
Deputy do.	John Willard,	1,300
Chief Clerk Canal Department,	George W. Newell,	1,500
Attorney-General,	George P. Barker,	1,000
Acting Canal Commissioners,	Jonas Earll, President,	2,000
" " "	George W. Little,	2,000
" " "	Benjamin Enos,	2,000
" " "	D. P. Bissell,	2,000
Canal Commissioners,	Stephen Clark,	$5.47 for each day's attendance.
" "	James Hooker,	
Canal Appraisers,	Chester Hayden,	$4 per day when employed.
" "	Thomas Clowes,	
" "	Geo. W. Cuyler,	
Commissary-General,	Henry Storms,	$700
Adjutant-General,	Archibald C. Nevin,	1,000
Speaker of the Assembly,	Elisha Litchfield.	
Clerk,	James R. Rose.	

Judiciary—Court of Chancery.

		Salary.
Chancellor,	Reuben H. Walworth,	3,000
Register,	John M. Davidson, and $2,500 for clerks and expenses.	2,500
Assistant do.	Hiram Walworth,	3,000

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VICE-CHANCELLOR'S COURT.

			Salary.
First Circuit,	Vice-Chancellor,	William T. M'Coun, fees and	$2,000
" "	Assistant do.	Lewis H. Sanford,	2,500
Eighth Circuit,	Vice-Chancellor,	Frederick Whittlesey,	1,600

The Judges of the Circuit Courts, except the above named 1st and 8th, are Chancellors for their respective circuits.

SUPREME COURT.

Chief Justice,	Samuel Nelson,	$3,000
Associate do.	Greene C. Bronson,	3,000
do. do.	Samuel Beardsley,	3,000
Reporter,	Nicholas Hill, Jr.	500

CIRCUIT COURTS.

	Judges.	Residence.
First Circuit,	William Kent,	New York.
Second do.	Charles H. Ruggles,	Poughkeepsie.
Third do.	Amasa J. Parker,	Delhi.
Fourth do.	John Willard.	Saratoga Springs.
Fifth do.	Philo Gridley,	Utica.
Sixth do.	Robert Monell,	Greene.
Seventh do.	Bowen Whiting,	Geneva.
Eighth do.	Nathan Dayton,	Lockport.

The Circuits of these Courts correspond in territory and name with the Senatorial districts of the State.

SUPERIOR COURT OF THE CITY OF NEW YORK.

Chief Justice,	Samuel Jones,	$2,500
Associate do.	Thomas J. Oakley,	2,500
" do.	Aaron Vanderpoel,	2,500
Reporter,	J. Prescott Hall.	
Clerk,	Charles A. Clinton.	

FINANCES OF THE STATE.

Revenue and Expenditure for the year ending September 30, 1843.

(From the Message of Governor Bouck, January 3, 1844.)

Receipts—		
Tolls, (deducting expenses of collection,)	$1,910,701 86	
Rent of surplus water	1,241 25	
Interest on current canal revenue	8,156 37	
		$1,920,099 48
Revenue of the general fund and all other sources		426,611 41
Mill tax		576,114 92
Total		$2,922,825 84

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Expenses—		
On State canals, including interest	$1,465,310 20	
Expenses of government, and all charges on the General Fund	1,027,249 83	
		2,492,560 03
Balance		$500,265 78

(About $500,000 will be required to pay allowances to contractors and damages awarded by the canal appraisers.)

STATISTICS OF THE NEW YORK STATE CANALS.

(Condensed from the Report of the Commissioners of the Canal Fund.)

Total Tolls on the Canals for ten years.

Year.	Erie Canal.	Other canals.	Total on all.
1834	$1,180,968	$160,362	$1,341,330
1835	1,376,673	172,313	1,548,986
1836	1,440,540	173,796	1,614,336
1837	1,144,170	148,453	1,292,623
1838	1,414,174	176,737	1,590,911
1839	1,427,032	189,350	1,616,382
1840	1,597,334	178,414	1,775,748
1841	1,813,651	221,231	2,034,882
1842	1,568,947	180,250	1,749,197
1843	1,880,315	201,275	2,081,590
Total	$14,843,804	$1,802,181	$16,645,985
First 5 years	2,388,037	831,661	7,388,186
Second do.	2,661,733	970,520	9,257,799

Boats employed on the New York State Canals.

Boats.	Number.	Av. Tonnage.	Value.
Packets	40	34	$40,000
Line Boats	389	54	389,000
Lake Boats	379	63	379,000
Bull Head Boats	118	62	118,000
Scow Boats, decked	327	56	600,000
Do. not decked	873	52	
Total	2,126	117,453	$1,526,000

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Comparative statement of the Tolls collected at the eastern and western terminations of the Erie Canal, for ten years.

	EAST.		WEST.	
Year.	Albany.	West Troy.	Buffalo.	Black Rock.
1834.....	$245,811	$133,129	$91,204	
1835.....	357,602	153,446	106,213	
1836.....	399,327	160,248	158,075	
1837.....	279,623	129,128	128,570	
1838.....	357.187	182,516	202,891	
1839.....	343,007	206,580	214,183	$40,778
1840.....	295,563	186,947	321,417	54,164
1841.....	344,037	265,890	348,688	83,935
1842.....	249,353	204,215	374,780	35,436
1843.. ...	274,496	291,648	505,319	38,889

NEW JERSEY.

(*Synopsis of the New Constitution, which went into operation September 2, 1844.*)

The Governor

Is elected by the people for the term of three years, commencing on the third Tuesday of January after his election; and is ineligible for the ensuing three years.

He must have attained the age of thirty years, and must have been for twenty years a citizen of the United States, and a resident of the State for the seven years preceding his election.

The Legislative Power

Is vested in a Senate and General Assembly.

The Senate

Is composed of nineteen members, one from each county in the State, elected for three years, one-third of the number being elected annually. Every Senator must have attained the age of thirty years, and have been a citizen and inhabitant of the State four years, and of the county for which he may be chosen one year next before his election, and must also be entitled to the right of suffrage.

The General Assembly

Is composed of fifty-eight members, elected annually by the people of the various counties, according to their population. Every member of the General Assembly must have attained the age of twenty-one years, and have been a citizen and inhabitant of the State two years, and of the

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county for which he may be chosen, one year next before his election, and must also be entitled to the right of suffrage.

The Judicial Power

Is vested in a Court of Errors and Appeals; a Court of Chancery; a Prerogative Court; a Supreme Court; Circuit Courts; and Inferior Courts. The Judges of the Court of Errors and Appeals are appointed by the Governor, with the advice and consent of the Senate, and hold their offices for the term of six years; the Judges of the Supreme Court, and the Chancellor, are appointed in the same manner, and hold their offices seven years; and the Judges of the Courts of Common Pleas are appointed by the Senate and General Assembly, in joint meeting, and hold their offices five years.

Secretary, Treasurer, &c.

The Secretary of State and Attorney General are appointed by the Governor, with the advice and consent of the Senate, and hold their offices five years.

The State Treasurer is appointed annually by the Senate and General Assembly in joint meeting.

The Right of Suffrage

Is enjoyed by every white male citizen of the United States, of the age of twenty-one years, who has resided in the State one year, and in the county where he claims his vote, five months next before the election; except paupers, idiots, insane persons, and persons convicted of crimes which preclude them from giving evidence in judicial proceedings.

Election, &c.

The General Election for State officers is held annually on the second Tuesday of October. The Senate and General Assembly meet annually, at Trenton, on the second Tuesday of January.

		Salary.
Governor,	Daniel Haines,	$2,000
Secretary of State,	Charles G. M'Chesney,	fees and 50
State Treasurer,	Thomas Arrowsmith,	1,000
Attorney-General,	Richard P. Thompson,	fees and 80

Supreme Court.

Chief Justice,	Joseph C. Hornblower,	$1,500
Associate do.	Ira C. Whitehead,	1,400
do. do.	John M. White,	1,400
do. do.	Daniel Elmer,	1,400
do. do.	James S. Nevius,	1,400
Clerk,	James Wilson,	Fees.
Reporter,	Robert E. Spencer,	200

Court of Chancery.

(The Governor acts as Chancellor, under the late Constitution, until the appointment of a Chancellor, at the first session of the Senate, under the new Constitution, in January, 1845.)

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PENNSYLVANIA.

The Governor

Is elected by the people, and holds the office three years. The same individual cannot hold the office more than six, in any period of nine years. Requisites for eligibility; the age of thirty years, and seven years residence in the State.

The Legislative Power

Is vested in a General Assembly, consisting of a Senate and House of Representatives.

The Senate

Consists of thirty-three members, elected by the people for three years, one-third of the number being elected annually. Requisites for membership of the Senate; the age of twenty-five years, a residence in the State four years next before election, and the last year in the district for which the member may be chosen.

The House of Representatives

Consists of one hundred members, elected annually by the people. Requisites for membership of the House; the age of twenty-one years, residence in the State three years next preceding election, the last year in the district for which the member may be chosen.

The Judicial Power.

All Judicial officers are appointed by the Governor, by and with the advice of the Senate. The Judges of the Supreme Court hold their offices fifteen years. The President Judges of the several Courts of Common Pleas hold their offices ten years. The Associate Judges of the Courts of Common Pleas hold their offices five years, except those of the First District, whose terms are ten years.

Secretary, Treasurer, &c.

The Secretary of the Commonwealth is appointed by the Governor, and holds the office during pleasure of the Executive. The Treasurer is elected annually by joint vote of the Senate and House of Representatives.

Right of Suffrage.

Every white freeman of the age of twenty-one years, who has resided in the State one year, and in the district where he offers his vote, ten days next preceding the election, and shall have paid a State or county tax, enjoys the rights of an elector.

Election, &c.

The election of the members of the General Assembly takes place on the second Tuesday of October annually. These bodies meet at Harrisburg on the first Tuesday of January annually.

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PENNSYLVANIA.

OFFICES.	NAMES OF OFFICERS AND RESIDENCE.		Salary per annum.
Governor,	DAVID R. PORTER,	Harrisburg,	$4,000
Secret'y of the Commonwealth and Sup. Common Schools,	Charles McClure,	"	1,700
Deputy Sec. Commonwealth,	Thomas L. Wilson,	"	1,000
State Treasurer,	Job Mann,	"	1,400
Auditor-General,	William F. Packer.	"	1,400
Surveyor-General,	Jacob Sallade,	"	1,200
Adjutant-General,	Adam Diller,	Philadelphia,	300
State Geologist,	Henry D. Rogers,	"	2,000
Speaker of the Senate,	William P. Wilcox,	M'Kean Co.	$4 per day
Speaker of the House of Reps.	James R. Snowden, (1844,)	Franklin Co.	" "
Board of Canal Commissioners,	James Clark, President,	Blairsville,	$3 per day
	Jesse Miller,	Perry Co.	" "
	William B. Foster, jr.	Bradford Co.	" "
JUDICIARY.			
Chief Justice Supreme Court,	John B. Gibson,	Carlisle.	$3,000*
Associate " " " "	Molton C. Rogers,	Philadelphia,	2,400*
" " " " "	Charles Huston,	Bellefonte,	2,400*
" " " " "	John Kennedy,	Philadelphia,	2,400*
" " " " "	Thomas Sergeant,	"	2,400*
Attorney-General,	Ovid F. Johnson,	" fees &	300
Prothonotary Eastern District,	Joseph Simon Cohen,	"	fees
" Western "	A. L. Pentland,	Pittsburgh,	fees
" Northern "	Charles Pleasants,	Sunbury,	fees
" Middle "	Philo C. Sedgwick,	Harrisburg,	fees
DISTRICT COURTS—FOR THE CITY AND COUNTY OF PHILADELPHIA.			
President Judge,	Thomas McKean Pettit,	Philadelphia,	2,000
Judge,	Joel Jones,	"	2,000
Judge,	George M. Stroud,	"	2,000
Prothonotary,	Edward C. Dale,	"	fees
FOR THE CITY AND COUNTY OF LANCASTER.			
Judge,	Alexander L. Hayes,	Lancaster,	2,500
FOR THE COUNTY OF ALLEGHENY.			
President Judge,	Robert C. Grier,	Pittsburgh,	2,000
Judge,	Charles Shaler,	"	2,000
FOR THE COUNTIES OF ERIE, CRAWFORD, VENANGO, MERCER AND WARREN.			
Judge,	James Thompson	Franklin,	1,600
COURTS OF COMMON PLEAS, &c.			
1st Dist. Philadelphia,	Edward King, President,	Philadelphia,	2,600
	John Richter Jones,	"	2,600
	James Campbell,	"	2,600
	Anson V. Parsons,	"	2,600
2d " Lancaster,	Ellis Lewis,	Williamsport	1,600
3d " Berks, Northampton, and Lehigh,	John Banks,	Reading,	2,000
4th " Centre, Clearfield, and Clinton,	George W. Woodward,	Wilkesbarre,	2,000
5th " Allegheny,	Benjamin Patten, Jr.	Pittsburgh,	2,500
6th " Erie, Crawford, Warren and Venango,	Gaylord Church,	Meadville,	1,600
7th " Bucks and Montgomery,	Thomas Burnsides,	Bellefonte,	2,000
8th " Northumberland, Lycoming and Columbia,	Joseph B. Anthony,	Williamsport	1,600
9th " Cumberland, Perry and Juniata,	Samuel Hepburn,	Carlisle,	2,000
10th " Westmoreland, Indiana, Armstrong and Cambria,	Thomas White,	Indiana,	2,000

* And Four Dollars per day while on the Circuit.

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OFFICES.	NAMES OF OFFICERS AND RESIDENCE.	Salary per annum.
11th District, Luzerne, Wayne, Pike and Wyoming,	William Jessup, ... Montrose,	2,000
12th " Dauphin and Lebanon,	Nathaniel B. Eldred, ... Harrisburg,	1,600
13th " Susquehanna, Bradford and Tioga,	John N. Conyngham, ... Wilkesbarre,	2,000
14th " Washington, Fayette and Greene,	Nathaniel Ewing, ... Uniontown,	2,000
15th " Chester and Delaware,	Thomas S. Bell, ... Westchester,	2,000
16th " Franklin, Bedford and Somerset,	Jeremiah S. Black, ... Somerset,	2,000
17th " Beaver, Butler and Mercer,	John Bredin, ... Butler,	2,000
18th " Potter, M'Kean, Jefferson and Elk,	Alexander M'Calmont, ... Franklin,	2,000
19th " York and Adams,	Daniel Durkee, ... York,	2,000
20th " Huntingdon, Mifflin and Union,	Abraham S. Wilson, ... Lewistown,	2,000
21st " Schuylkill, Carbon and Monroe,		1,600

FINANCES OF THE STATE,

From December 1, 1842, *to November* 30, 1843, *inclusive.*

(Condensed from the Annual Report of the Auditor General, December 3, 1843.)

Receipts—	
Tax on real and personal estate	$553,911 38
Canal and rail road tolls	1,019,401 15
Sale of State stocks	1,395,411 84
All other sources	435,710 00
Total	$3,404,434 37
Balance on hand, December 1, 1842	554,181 13
	$3,958,615 50
Expenditures—	
Commissioners of the Internal Improvement Fund	$747,263 92
Expenses of Government	295,480 74
Militia expenses	42,448 59
Education	406,694 36
Domestic creditors	1,261,236 78
Cancelled Relief Notes	508,000 00
All other expenses	236,019 61
Total	$3,499,144 00
Balance in the Treasury, December 1, 1843,	$459,471 50

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STATE CANALS AND RAILROADS.

Receipts and Expenditures from November 30, 1842, to November 30, 1843.

(From the Annual Report of the Canal Commissioners, December 30, 1843).

	Expenditures.	Receipts.
Main Line	$425,036 82	$857,212 94
Delaware Division	22,553 92	92,265 41
Susquehanna, North and West Branches	59,226 80	62,206 06
Beaver, Shenango and French Creek	15,410 82	6,156 71
	$522,228 36	$1,017,841 12
		522,228 36
Surplus		$495,612 76
Deduct drawback on flour and pork		22,436 80
		$473,175 96
Add increase of stock on Columbia Railroad		9,481 38
Clear profits of all the works for 1843		$482,657 34

Canal and Railroad Tolls for a series of years.

Years.	Amount.	Years.	Amount.
1830	$25,748 68	1838	$959,336 32
1831	38,241 20	1839	1,076,045 47
1832	50,909 57	1840	1,195,751 33
1833	151,419 69	1841	1,055,394 60
1834	309,789 15	1842	907,093 12
1835	684,357 77	1843	1,019,401 15
1836	837,805 72		
1837	975,350 49	Total	$9,286,644 26

Amount of tolls received on the public works of Pennsylvania, from the 1st of December, 1843, until 31st of May, 1844,	$488,704 50
Amount of tolls received on the public works of Pennsylvania, from the 1st of December, 1842, until 31st of May, 1843,	318,419 01
Difference in favour of the present year, up to 31st of May last,	$170,285 49

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Receipts and Expenditures of the Philadelphia and Columbia Railroad, for a series of years.

Length 82 miles. Cost, $4,204,969 96.

Years.	Revenue.	Expenditures.
1833	$5,002 58	None.
1834	40,240 32	None.
1835	183,609 80	$163,691 31
1836	260,657 83	288,388 91
1837	353,566 18	403,996 74
1838	390,636 32	197,200 69
1839	389,973 97	264,287 22
1840	445,552 32	550,238 33
1841	411,536 96	339,169 86
1842	345,081 63	340,208 42
1843	369,496 08	288,502 54
Total	$3,195,353 99	$2,835,684 32
Excess of Revenue	$359,669 67	

The following is a statement of the receipts and expenditures on the Philadelphia and Columbia Railway for the month of May, 1844:—

Receipts as per reports of Collectors	$49,700 69
Expenditures and liabilities for the month	16,987 67
Excess of receipts over expenses	$32,713 02
Add excess from January 1 to May 1,	87,345 33
Total excess, or nett revenue, for five months, ending June 1, 1844,	$120,058 35

PUBLIC SCHOOLS.

(From the Annual Report of the Superintendent of Common Schools, January 7, 1844.)

Condition of the Schools, (except those in Philadelphia City and County,) during the year ending on the first Monday of June, 1843.

Number of School Districts in the State,	1,139
Number that have levied a School Tax, and drawn the State appropriation	945
Of which the annual reports have been forwarded from	865
In these reporting districts, there were:	
Number of schools kept open	6,156
Average duration of time	5 months and 14½ days
Number of male teachers	5,264
Average monthly salaries	$17 54
Number of female teachers	2,330

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Average monthly salaries		$11 06
Number of male scholars		161,164
" " female "		127,598
Average number in each school		45
Cost of instruction of each scholar per quarter		$1 21
Expenditure—		
Aggregate cost of instruction	$446,307 61	
Fuel and contingencies	38,146 51	
School houses	92,749 01	
		$577,203 13
Revenue—		
Amount of State appropriation paid to accepting districts		$272,720 00
Amount of School tax levied in do.		419,920 90
		$692,640 90

THE SCHOOLS IN THE CITY AND COUNTY OF PHILADELPHIA

Are established on an organization differing in some particulars from the general system. The following is extracted from the Report of the Controllers, July, 1843:

Number of schools in the district		214
" " male teachers	87	
" " female "	412	
		499
Average annual compensation		$274 23
Aggregate amount of salaries		$136,843 00
Number of scholars		33,130
Increase since last year		5,222
Aggregate expenses of the Board		$192,511 18
Average annual expense for each pupil:		
For tuition	$4 13	
Other expenses	1 68	
		$5 81

FINANCES OF THE CITY OF PHILADELPHIA, FOR THE YEAR 1844.

(From the Report of the Committee on Finance, to the City Councils, March 13, 1844.)

Statement, showing the fiscal liabilities of the Corporation during the year 1844, and its means to meet the same within that period.

LIABILITIES.

Unclaimed Loans—		
One per cent. Loan, due May 1838 and 1839,	$1,964 60	
Six per cent. Loan, due January 1st, 1830,	200 00	
Five per cent. Loan, due January 1st, 1840,	900 00	
		$3,064 60

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Amount brought forward		$3,064 60
Due Trustees of Ice Boat	$9,658 88	
Due the several Trust Funds	690 13	
Due Sinking Fund	44,530 70	
		54,879 71

Appropriations asked for by the several Standing Committees, to meet the expenditures in their respective departments within the current year, and outstanding claims from 1843; after deducting from the aggregate of those sums the balances standing to the credit of the Committees on the 1st of January, 1844:

Watering Committee	$35,096 53	
Finance	169,000 00	
Police	118,006 85	
Highways	27,808 86	
Cleansing	10,893 00	
City Property Committee	30,700 00	
Legacies and Trusts	8,850 00	
Trustees of the Ice Boat	7,500 00	
		407,855 24
Appropriation to the Sinking Fund		36,000 00
Do. from Appropriation to Ice Boat		1,000 00
Total sum to be provided for		$502,799 55

Means of the Corporation to meet the above liabilities—

Cash in the Treasury, January 1, 1844, after deducting the semi-annual interest on the City debt due that day, and provided for in the estimates and taxes of 1843; and the balances to the credit of the Standing Committees, and deducted from their estimated expenditures of 1844	$81,196 24	
Uncollected taxes of 1843	20,000 00	
Water rents	149,000 00	
Market rents	30,000 00	
City Property rents	19,000 00	
Revenue from Tobacco Warehouse	11,000 00	
Contingent moneys	5,000 00	
		315,196 24
Amount to be raised by taxation		$187,603 31

The assessed value of real estate within the City, as shown by the returns of the County Commissioners on the 28th of February, 1844, is $56,694,581. From this amount is to be deducted such allowances as may be made by the Commissioners on the days of appeal, from the value as affixed by the Assessors. The appeals are not required by law to close until the 20th of April next. What sum will be abated cannot at this time be accurately known; but the Committee deem it safe to assume, that the amount will not be ultimately fixed below $56,000,000. A tax of 36 cents on the $100 of this sum, together with a personal tax of $6,000, will be sufficient to provide for the deficiency as shown above, and required to be raised by taxation.

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DELAWARE.

The Governor

Is elected by the people for four years, and cannot be elected a second term. Requisites for eligibility—the age of thirty years, a citizenship and residence in the United States for twelve years next before his election, the last six within the State.

The Legislative Power

Is vested in a General Assembly, consisting of a Senate and House of Representatives.

The Senate

Consists of nine members, (three from each county), elected by the people for four years. Requisites for membership of the Senate — the age of twenty-seven years, an estate in the county for which the member is chosen of the value of a thousand pounds, a residence in the county one year, and in the State three years next preceding the election.

The House of Representatives

Consists of twenty-one members, (seven from each county), elected by the people biennially. Requisites for membership—the age of twenty-four years, residence in the State three years, and in the county for which the member is elected one year next preceding election.

The Judiciary Power.

All Judges are appointed by the Governor, and hold their offices during good behaviour.

Right of Suffrage.

Every free white male citizen of the age of twenty-two years and upwards, having resided in the State one year next previous to election, the last month thereof in the county where he offers his vote, and having paid a tax within two years, enjoys the right of an elector. Every free white male citizen of the age of twenty-one years, and under the age of twenty-two years, having resided as aforesaid, is entitled to vote without the payment of any tax. No person in the military, naval, or marine service of the United States, is considered a citizen of the State in consequence of being quartered or stationed within the State; and no idiot, insane person, pauper, or person convicted of a crime deemed by law felony, enjoys the rights of an elector. The Legislature has power to impose the forfeiture of the right of suffrage as a punishment for crime.

Election, &c.

All elections for Governor, Senators, Representatives, Sheriffs and Coroners, are held on the second Tuesday of November. The General Assembly meet on the first Tuesday of January biennially at Dover.

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DELAWARE.

			Salary.
Governor,	WILLIAM B. COOPER,		$1,333 34
Secretary of State,	John W. Houston,	fees and	400 00
Treasurer,	Gardiner H. Wright,		500 00
Auditor,	Simon Spearman,		500 00
Speaker of Senate,	Presley Spruance, (1843–5,)	$4 per day during session.	
Speaker of House,	William O. Redden, " "		

SUPERIOR COURT.

Chief Justice,	James Booth,		$1,200 00
Associate do.	Samuel M. Harrington,		*1,200 00
do. do.	John J. Milligan,		1,000 00
One vacancy.			
Attorney-General,	Edward W. Gilpin,	fees and	350 00

COURT OF CHANCERY AND ORPHANS' COURT.

Chancellor,	Kensey Johns, Jr.,	$1,100 00

FINANCES.

(From the Report of the Auditor of Accounts, January, 1843.)

Receipts during 1842	$33,899 36
Expenditures	27,424 56
Balance	$6,474 80
Surplus Funds—	
State Fund	$344,705 64
School Fund	175,750 24
Total	$520,455 88

PUBLIC SCHOOLS.

Amount of payments for purposes of education during the school year ending October 1, 1842,	$41,193 83
Number of scholars	10,359

* $1,000 as Associate Judge and $200 as Reporter.

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MARYLAND.

The Governor

Is elected by the people once in three years. The State is divided into three districts—the Eastern, Southern, and North-western. The Eastern District comprises the counties of Cecil, Kent, Queen Anne, Caroline, Talbot, Dorchester, Somerset and Worcester. The Southern District, comprises the counties of Saint Mary's, Charles, Calvert, Prince Georges, Anne Arundel, (which includes the City of Annapolis,) Montgomery, and Baltimore City. The North-western District comprises the counties of Baltimore, Harford, Carroll, Frederick, Washington and Alleghany. The Governor is elected from the districts alternately, each district or part of the State being represented in the Gubernatorial chair for one term in each period of nine years. He must be at least thirty years of age, and be a resident of the district from which he is elected three years next preceding the election.

The Legislative Power

Is vested in two branches, the Senate and House of Delegates.

The Senate

Consists of twenty-one members, elected by the people for six years; one-third of the number being elected every two years. Requisites for membership of the Senate—the age of twenty-five years, and residence in the city or county for which the member may be chosen, three years next preceding the election.

The House of Delegates

Consists of seventy-eight members, elected annually by the people. Requisites for membership of the House—the age of twenty-one years, and residence in the county for which the member may be chosen, one year next preceding the election.

The Judiciary Power.

All judges are appointed by the Governor, with the advice and consent of the Senate, and hold their offices during good behaviour.

Right of Suffrage.

Every white male citizen above the age of twenty-one years, who has resided in the State one year next preceding the election, and in the county or city where he offers his vote six months preceding the election, has the right of suffrage.

Election, &c.

The annual election takes place on the first Wednesday of October. The Legislature meets at Annapolis on the last Monday of December annually.

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	Salary.
Governor, FRANCIS THOMAS,	$4,200
Secretary of State, ——— Buskirk,	2,000
State Treasurer,* Dennis Claude,	2,500
Surveyor-General, L. Goodwin M'Blair,	800
Attorney-General, Josiah Bayley,	Fees.
Adjutant-General, J. N. Watkins,	500

President of the Senate, Richard Thomas.
Speaker of the House of Representatives, W. H. Watson, (1843–4.)

COURT OF APPEALS.

Chief Justice,	John Buchanan,	$2,500
Associate do.	Stevenson Archer,	2,200
do. do.	Thomas B. Dorsey,	2,200
do. do.	Ezekiel F. Chambers,	2,200
do. do.	Ara Spence,	2,200

(One vacancy.)

Clerk and Reporter,	Richard W. Gill,	Fees.

COURT OF CHANCERY.

Chancellor,	Theodorick Bland,	3,600

IMPORTATIONS AND INSPECTIONS OF BALTIMORE.

The following table exhibits a few of the leading articles of Foreign Produce, imported into the district of Baltimore during the quarter ending June 30, 1843 and 1844.

		1844.	1843.
Importations—			
Coffee	bags	56,761	36,842
Sugar	hhds.	4,727	4,283
"	boxes	2,188	3
Molasses	hhds.	2,898	1,660
Hides, dry		65,475	38,333
" wet, salted		2,254	51
Inspections—Flour and Meal—			
Flour	bbls.	98,642	102,473
Rye Flour	"	3,867	3,410
Corn Meal	hhds.	81	407
" "	bbls.	8,474	3,873
Tobacco—			
Maryland	hhds.	13,018	13,008
Ohio	"	5,492	2,971
Virginia	"	92	77
Kentucky	"	509	1,555
Missouri	"	4	25
Beef and Pork—			
Beef	bbls.	219	750
Pork	"	6,945	6,419
Whiskey—			
Number of hhds.		733	555
" bbls.		9,670	9,273

* The proper title of this officer is,—"Treasurer of the Western Shore of Maryland."

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VIRGINIA.

The Governor

Is elected by the joint vote of the two Houses of Assembly once in three years, and is ineligible for the succeeding three years. Requisites for eligibility—the age of thirty years, native citizenship of the United States, and a residence in the State five years next preceding the election.

The Council of State.

Consists of three members, elected by joint vote of the General Assembly, who remain in office three years, one of the number retiring annually. The Councillors are the advisers of the Governor. The Senior Councillor is Lieutenant-Governor, and acts as Governor in the event of that officer's death, resignation, absence or inability.

The Legislature

Consists of two distinct branches, the Senate and House of Delegates, which together are styled the General Assembly of Virginia.

The Senate

Consists of thirty-two members, elected by the people for four years, one-fourth of the number retiring annually. Requisites for membership of the Senate — the age of thirty years, a residence and freehold in the district from which the member is elected.

The House of Delegates

Consists of one hundred and thirty-four members, elected annually by the people. Requisites for membership of the House—the age of twenty-five years, a residence and freehold in the district for which the member is elected. No person holding a lucrative office, ministers of the gospel, or priests of any denomination, are capable of being members of either House of Assembly.

The Judiciary Power.

The Judges of the Supreme Court of Appeals and of the Superior Courts are elected by the joint vote of both Houses of Assembly, and hold their offices during good behaviour. The Attorney-General is appointed in the same manner, and holds his office during the pleasure of the General Assembly.

Right of Suffrage.

Every white male citizen of the State, twenty-one years of age and upwards, who owns an interest in a freehold estate of the value of twenty-five dollars, or who is a housekeeper or head of a family and paid taxes, excepting paupers, non-commissioned officers, soldiers, seamen or marines in the service of the United States, and persons convicted of infamous crimes, is entitled to the right of suffrage.

Election, &c.

The annual election takes place on the fourth Thursday of April. The General Assembly meet annually at Richmond on the first Monday of December. At all elections the votes are given openly, or *vivâ voce*, and not by ballot, as in most other States.

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VIRGINIA.

		Salary.
Governor,	James McDowell,	$3,333⅓
Lieutenant-Governor,	John M. Patton,	1,000
Councillor of State,	John Rutherford,	1,000
" "	John F. Wiley,	1,000
Treasurer,	Fabius M. Lawson,	2,000
Auditor,	James E. Heath,	2,000
2d Auditor & Sup. Library Fund,	James Brown, Jr.	2,000
Register of Land Office,	Stafford H. Parker,	1,500
Attorney-General,	Sidney S. Baxter, .. fees and	1,000
Secretary of the Commonwealth Librarian and Adjutant-General,	Wm. H. Richardson,	1,720
Clerk of the Council,	Thomas F. Lawson,	1,000
Superintendent Penitentiary,	Charles S. Morgan,	2,000
Speaker of the Senate,	Charles Hunton,	$6 per day.
Speaker of the House of Delegates,	Joel Holleman,	$8 per day.

Judiciary—Court of Appeals.

President,	William H. Cabell,	$2,750
Judge,	Francis T. Brooke,	2,500
"	Robert Stanard,	2,500
"	John J. Allen,	2,500
"	Briscoe G. Baldwin,	2,500
Clerk of Eastern District,	Joseph Allen,	1,000
" Western "	John A. North,	1,000

Judges of the General Court.

Circuit No. 1,	Richard H. Baker,	Salary of the first 20 Judges, $1,500 each, and $4 for every 20 miles they may be compelled to travel to and from their respective courts.
" " 2,	James H. Gholson,	
" " 3,	Thomas M. Bayley,	
" " 4,	John B. Christian,	
" " 5,	John T. Lomax,	
" " 6,	John Scott,	
" " 7,	John B. Clopton,	
" " 8,	Daniel A. Wilson,	
" " 9,	William Leigh,	
" " 10,	Fleming Saunders,	
" " 11,	Richard H. Field,	
" " 12,	Lucas P. Thompson,	
" " 13,	Isaac R. Douglass,	
" " 14,	Daniel Smith,	
" " 15,	Benjamin Estill,	
" " 16,	James E. Brown,	
" " 17,	Edward Johnson,	
" " 18,	Edwin S. Duncan,	
" " 19,	David McComas,	
" " 20,	J. L. Fry,	
" " 21,	P. N. Nicholas (Metropolitan Circuit),	$2,000
" " 22,	John Robertson, Judge of the Court of Chancery for the 21st Circuit,	2,000

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NORTH CAROLINA.

The Governor

Is elected by the qualified voters for the House of Commons once in two years. The same individual cannot be elected more than four, in any term of six years. Requisites for eligibility—the age of thirty years, a freehold estate of the value of one thousand pounds, and five years residence in the State.

The Council of State

Consists of seven persons, elected by the General Assembly at their first meeting, who hold the office two years.

The Legislative Power

Is vested in a Senate and House of Commons, which, collectively, are denominated the General Assembly.

The Senate

Is composed of fifty members, elected by the people biennially. Requisites for membership of Senate — residence, and possession, for one year previous to the election, of three hundred acres of land in the district for which the member may be chosen.

The House of Commons

Is composed of one hundred and twenty members, elected biennially by the people. Requisites for membership — residence, and possession, for a year previous to election, of land to the amount of one hundred acres in the county for which the member may be chosen.

The Judiciary Power.

The General Assembly, by joint ballot, appoint Judges of the Supreme Courts of Law and Equity, Judges of Admiralty, and the Attorney-General. The Judges hold their offices during good behaviour; the Attorney-General for four years.

Right of Suffrage.

All freemen of the age of twenty-one years and upwards, who have resided in any one county within the State twelve months immediately preceding the election, and have paid taxes, are entitled to vote for members of the House of Commons for the county in which they reside; and every freeman qualified as above, and possessing within the Senatorial district of which he is an inhabitant, fifty acres of land—excepting free negroes, free mulattoes, or free persons of mixed blood descended from negro ancestors to the fourth generation—is entitled to vote for a member of the Senate.

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Election, &c.

The next election for Governor, Senators, and members of the House of Commons, will be held on the first Thursday of August, 1846, and every two years thereafter. The General Assembly meet at Raleigh once in two years. The next meeting will be on the third Monday of November, 1844.

	Salary.
Governor, John M. Morehead, the use of a furnished house and	$2,000
William A. Graham, (January 1845, to January 1847.)	
Secretary of State, William Hill, ... Fees and	800
Treasurer, John H. Wheeler, ...	1,500
Comptroller, William F. Collins, ...	1,000
" House, Calvin Graves.	
Attorney-General, Spear Whitaker, ...	Fees.

Supreme Court.

Chief Justice, ... Thomas Ruffin, ...	$2,500
Associate " .... Joseph J. Daniel, ...	2,500
" " .... Frederick Nash, ...	2,500
Reporter, ... James Iredell, Copy-right of State Reports &	300

Superior or Circuit Courts.

(*Having also Equity powers.*)

Judges.	Salary.
Thomas Settle, ...	$1,950
John M. Dick, ...	1,950
John L. Bailey, ...	1,950
Richard M. Pearson, ...	1,950
William H. Battle, ...	1,950
Matthias E. Manly, ...	1,950
(One vacancy.)	

The State is divided into seven Circuits, in which these Judges preside alternately, no one presiding twice successively in one Circuit.

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SOUTH CAROLINA.

The Governor

Is elected by the General Assembly once in two years. He cannot be re-elected until the expiration of four years after his term has expired. Requisites for eligibility—the age of thirty years, residence in the State ten years, and an estate within the State of the value of fifteen hundred pounds sterling above his debts.

The Lieutenant-Governor

Is elected at the same time, and in the same manner, remains in office for the same period, and must be possessed of the same qualifications. He succeeds as Governor in the event of that officer's death, removal, resignation or absence.

The Legislative Power

Is vested in a General Assembly, which consists of a Senate and House of Representatives.

The Senate

Consists of forty-five members, elected for four years by the people. One-half of the number are elected biennially. No person is eligible to the Senate unless he be a free white man of the age of thirty years and upwards, and has been a citizen and resident of the State five years previous to his election. If a resident in the election district for which he is elected, he must possess a freehold estate in that district of the value of three hundred pounds clear of debt. If a non-resident of the district, he must possess a freehold estate therein of one thousand pounds clear of debt.

The House of Representatives

Consists of one hundred and twenty-four members, elected biennially by the people. No person is eligible to the House of Representatives unless he be a free white man, twenty-one years of age or upwards, and has been a citizen of the State at least three years previous to his election. If a resident within the district for which he is elected, he must be possessed of a freehold estate of five hundred acres of land and ten negroes, or of real estate to the value of one hundred and fifty pounds sterling, clear of debt; and if a non-resident, he must possess a freehold estate therein of five hundred pounds sterling, clear of debt.

Judiciary Power.

The Judges of the Superior Courts are elected by joint vote of the General Assembly, and hold their offices during good behaviour.

Treasurer, Secretary, &c.

The Treasurer, Secretary of State, and Surveyor-General, are elected in same manner as the Judges, and hold their offices four years, but are not again eligible until four years after the expiration of the respective terms.

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Right of Suffrage.

Every free white man of the age of twenty-one years, (paupers, non-commissioned officers, and soldiers of the United States excepted,) a citizen of the State, having resided therein two years, who has a freehold of fifty acres of land, or a town lot, of which he has been possessed at least six months before the election, or has paid a State tax of three shillings sterling the preceding year, and been a resident of the district where he offers his vote six months preceding the election, is entitled to vote.

Election, &c.

Senators and members of the House of Representatives are elected on the second Monday of October and the day following, biennially. The next election will take place in 1846. The General Assembly meets at Columbia biennially on the fourth Monday of November; and the next meeting will be in 1846.

		Salary.
Governor, James H. Hammond,		$3,500
Lieutenant-Governor, Isaac D. Witherspoon.		
Secretary of State, Robert Q. Pinckney,		Fees.
Treasurer of Lower Division, B. R. Carroll,		2,000
" " Upper " Julius J. Du Bose,		1,600
Comptroller-General, William Laval,		2,000
Attorney-General, H. Bailey,	Fees and	1,100
President of the Senate, Angus Patterson, (1842–4.)		
Speaker of the House, W. F. Collock, (1842–4.)		

Judiciary.

Chancellor in Equity, David Johnson,	3,500
" " Job Johnston,	3,000
" " William Harper,	3,000
" " Benjamin F. Dunkin,	3,000

Common Pleas and General Sessions.

Judges, John S. Richardson,	3,500
" D. L. Wardlaw,	3,000
" Josiah J. Evans,	3,000
" A. Pickens Butler,	3,000
" J. B. O'Neall,	3,000
(One vacancy.)	
Reporter, J. J. M'Mullan,	1,500

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GEORGIA.

The Governor

Is elected by the people for the term of two years. No person is eligible to this office unless he has been a citizen of the United States twelve years, an inhabitant of the State six years, has attained the age of thirty years, and is in possession of five hundred acres of land within the State, and other property to the amount of four thousand dollars, nor unless his estate is worth this sum above the amount of his debts.

The Legislative Power

Is vested in the Senate and House of Representatives, which are styled the General Assembly.

The Senate

Consists of ninety-three members, (one from each county), who are elected annually. Every Senator must have attained the age of twenty-five years, must have been a citizen of the United States nine years, an inhabitant of the State three years, and of the county for which he is returned one year, and must be possessed of a freehold estate of five hundred dollars, or taxable property to the amount of one thousand dollars within the county for which he is elected, above the amount of his debts.

The House of Representatives

Consists of two hundred and seven members, who are elected annually. Every representative must have attained the age of twenty-one years, must have been a citizen of the United States seven years, of the State three years, and of the county for which he is returned one year preceding his election, and must be possessed of a freehold estate of the value of two hundred and fifty dollars, or of taxable property to the amount of five hundred dollars within the county for which he is elected, above the amount of his debts.

The Judiciary Power.

The Judges of the Superior Courts are elected by the General Assembly, and hold their offices three years. The Justices of the Inferior Courts are elected annually, by voters in each county. The States' Attorney and Solicitor are elected by the General Assembly, and hold their appointments three years.

Secretary, Treasurer, &c.

The Secretary of State, Treasurer, and Surveyor-General, are elected biennially by the General Assembly.

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Right of Suffrage.

Citizens and inhabitants of the State, who have paid taxes for the year preceding the election, and who have resided six months in the county where they may offer their votes are entitled to the privileges of electors.

		Salary.
Governor,	George W. Crawford,	$3,000
Secretary of State,	N. C. Barnett,	1,600
Treasurer,	Benjamin B. Smith,	1,600
Attorney-General,	James Gardner,	fees and 250
Surveyor-General,	Alfred M. Horton,	1,600
President of the Senate,	Charles Dougherty, (1843–4,) $5 per day during session.	
Speaker of the House,	Charles J. Jenkins, (1843–4,) $5 per day during session.	

Judiciary.

Circuit Courts.

Circuits.	Judges.	
1. Eastern,	Charles S. Henry,	$1,800
2. Middle,	John Schley,	1,800
3. Northern,	Garnet Andrews,	1,800
4. Western,	Junius Hillyer,	1,800
5. Ockmulgee,	Francis Cone,	1,800
6. Southern,	Carlton B. Cole,	1,800
7. Flint,	Edward D. Tracy,	1,800
8. Chattahoochee,	Joseph Sturgis,	1,800
9. Cherokee,	—— Anderson,	1,800
10. Coweta,	William W. Ezzard,	1,800
11. South-western,	William Taylor,	1,800

ALABAMA.

The Governor

Is elected biennially by the people, and is ineligible for more than four years in any term of six years. He must be a native citizen of the United States, at least thirty years of age, and must have resided in the State at least four years immediately before his election.

The Legislative Power

Is vested in two distinct branches, the Senate and House of Representatives, which together are styled the General Assembly.

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The Senate

Consists of thirty-three members, elected by the people for three years, one-third being elected annually. Every Senator must be a free white citizen of the United States, at least twenty-seven years of age. He must have been an inhabitant of the State two years immediately preceding the election, and of the district for which he is elected during the latter of these years.

The House of Representatives

Consists of one hundred members, elected annually by the people. Every representative must be a white man, a citizen of the United States, an inhabitant of the State at least two years immediately preceding his election, the last of which in the district for which he is elected, and must have attained the age of twenty-one years.

The Judiciary Power.

Chancellors, Judges of the Supreme Court, of the Circuit and Inferior Courts, are elected by joint vote of the General Assembly, and hold their offices during six years. The Attorney-General is elected in like manner, and holds his office four years.

Secretary, Treasurer, &c.

The Secretary of State is elected by joint vote of the General-Assembly, and holds his office two years. The Treasurer and the Comptroller of Public Accounts are elected in the same manner annually.

Right of Suffrage.

Every white male citizen, twenty-one years of age and upwards, who is a citizen of the United States, and has resided in the State one year next preceding any election, and the last three months in the district in which he offers his vote, is deemed a qualified elector.

Election, &c.

The election takes place annually, on the first Monday of August and the following day. The General Assembly meets at Tuscaloosa on the first Monday of November annually.

			Salary.
Governor,	Benjamin Fitzpatrick,		$2,500
Secretary of State,	William Garrett,	fees and	1,000
Treasurer,	Samuel G. Frierson,	fees and	1,000
Comptroller of Public Accounts,	Jefferson C. Vandyke,	fees and	1,000
Attorney-General,	Matthew W. Lindsay,	fees and	425
President of the Senate,	Nathaniel Torry, (1843–4.)		
Speaker of the House,	John Erwin, (1843–4.)		

Supreme Court.

Chief Justice,	Henry W. Collier,	$2,250
Associate Justice,	Henry Goldthwaite,	2,250
" "	John J. Ormond,	2,250

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MISSISSIPPI.

The Governor

Is elected biennially by the people, and is ineligible for more than four years in any term of six years. He must be at least thirty years of age, and must have been a citizen of the United States for twenty years, resident in the State at least five years next preceding his election.

The Legislative Power

Is vested in two distinct branches, a Senate and House of Representatives, which together are styled the Legislature of the State of Mississippi.

The Senate

Consists of 32 members, citizens of the United States, at least thirty years of age, one-half of the number being elected biennially by the people, to serve four years. Every Senator must have been an inhabitant of the State four years, and of the district for which he is elected one year, immediately preceding his election.

The House of Representatives

Consists of one hundred members, citizens of the United States, at least twenty-one years of age, elected biennially by the people. Every representative must have been a resident of the State two years, and of the county, city, or town for which he is elected one year, next preceding the election.

The Judiciary Power.

The Judicial officers are elected by the people as follows:—The Judges of the High Court of Errors and Appeals, for the term of six years; the Judges of the Circuit Court, for the term of four years; the Chancellor, for the term of six years; the Judges of the Court of Probate, for the term of two years. The Judges of the High Court of Appeals and Errors and the Chancellor are required to have attained the age of thirty years; the Judges of the Circuit Court and Court of Probate, twenty-six years.

Secretary, Tteasurer, &c.

The Secretary of State, the Treasurer, and the Auditor, are elected by the people for the term of two years.

Right of Suffrage.

Every free white male person, twenty-one years of age and upwards, a citizen of the United States, who has resided in the State one year, and in the county where he offers his vote four months preceding an election, is entitled to vote.

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Election, &c.

The election for Senators and Representatives takes place biennially on the first Monday of November and the ensuing day. The Legislature meets at Jackson on the first Monday of January, biennially.

		Salary.
Governor,	Albert G. Brown,	$3,000
Secretary of State,	William Hemingway,	3,000
Auditor,	James E. Matthews,	3,000
Treasurer,	William Clark,	2,000
Attorney-General,	John D. Freeman,	2,000

President of the Senate, ...Jesse Speight.
Speaker of the House of Representatives, James L. Totten.

High Court of Errors and Appeals.

President Judge,	William L. Sharkey,	$3,000
Associate Judge,	Alexander M. Clayton,	3,000
" "	J. S. B. Thatcher,	3,000

Court of Chancery.

Chancellor,	Robert H. Buckner,	$4,000

LOUISIANA.

The Governor

Is elected once in four years by the people, and is ineligible for the next succeeding four years. He must be at least thirty-five years of age, and a citizen of the United States. He must have been an inhabitant of the State at least six years next preceding his election, and must also possess in his own right a landed estate of the value of five thousand dollars.

The Legislative Power

Is vested in a Senate and House of Representatives, which together are styled the General Assembly.

The Senate

Consists of seventeen members, citizens of the State, at least twenty-seven years of age, and possessed of a landed property to the value of one thousand dollars. The election for Senators is held biennially by the people, and one-half the number are chosen at each election. No candidate is eligible unless he has resided in the State four years, and

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in the district for which he is a candidate one year immediately preceding the election.

The House of Representatives

Consists of sixty members, free-white citizens of the United States, at least twenty-one years of age, and possessed of a landed estate to the value of five hundred dollars. The representatives are chosen biennially by the people. No one is eligible unless he has resided in the State two years, and in the district in which he is a candidate, one year, immediately preceding the election.

The Judiciary Power.

The Judges of the Supreme and Inferior Courts are appointed by the Governor, with the advice and consent of the Senate. They hold their appointments during good behaviour. The Attorney-General and Prosecuting Attorneys are appointed in the same manner.

Right of Suffrage.

Every free white male citizen of the United States, twenty-one years of age and upwards, who has resided in the county in which he offers his vote, one year next preceding the election, and has paid a State tax within six months, is an elector.

Election, &c.

The election for Senators and Representatives takes place on the first Monday of July biennially. The General Assembly meets annually at New Orleans on the first Monday of January.

		Salary.
Governor,	Alexander Mouton,	$6,000
Secretary of State,	Robert C. Nicholas,	2,000
Treasurer,	William Debuys,	4,800
Attorney-General,	Isaac T. Preston,	3,000

President of the Senate, ... Felix Garcia.
Speaker of the House of Representatives, Charles Derbigny.

Supreme Court.

Judge,	Francois X. Martin,	$5,000
"	Alonzo Morphy,	5,000
"	Edward Simon,	5,000
"	Henry A. Bullard,	5,000
"	Rice Garland,	5,000

Reporter ..... Merritt M. Robinson.

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ARKANSAS.

The Governor

Is elected by the people once in four years. He must be at least thirty years of age, and a native-born citizen of the United States, or a resident in the State ten years previous to the adoption of the Constitution. He must also have been a resident of the State four years next preceding his election.

The Legislative Power

Is vested in a General Assembly, which consists of a Senate and House of Representatives.

The Senate

Consists of twenty-one members, free white male citizens of the United States, at least thirty years of age. The term of Senatorial service is four years, and one-half the number are chosen biennially by the people. No one is eligible unless a resident of the State for one year preceding, and an actual resident of the district at the time of the election.

The House of Representatives

Consists of sixty-six members, free white male citizens of the United States, at least twenty-five years of age. The representatives are chosen biennially by the people, and no one is eligible unless an actual resident of the county in which he is a candidate.

The Judiciary Power.

The Judges of the Supreme and Circuit Courts are elected by joint vote of the General Assembly. The Judges of the Supreme Court must be at least thirty years of age, and hold their offices eight years. The Judges of the Circuit Courts must be at least twenty-five years of age, and hold their offices four years.

Secretary, Treasurer, &c.

The Secretary, Treasurer, and Auditor, are elected by the General Assembly. The Secretary holds his office four years; the Treasurer and Auditor each two years.

Right of Suffrage.

Every white male citizen of the United States, of the age of twenty-one years and upwards, who has resided in the State six months, is deemed a qualified elector in the county or district where he actually resides.

Election, &c.

The election takes place biennially on the first Monday of October. The votes are given *vivâ voce*. The General Assembly meets at Little Rock on the first Monday of November, also biennially. The next election, and the next meeting of the General Assembly will be in 1846.

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		Salary.
Governor,	SAMUEL ADAMS, (acting,)	$1,800
Secretary of State,	David B. Greer,	600
Treasurer,	John Hutt,	800
Auditor,	Elias N. Conway,	800
Attorney-General,	Robert W. Johnson,	Fees.

SUPREME COURT.

Chief Justice,	Daniel Ringo,	1,500
Associate "	Townsend Dickinson,	1,500
" "	Thomas J. Lacy,	1,500
Reporter,	Albert Pike.	

TENNESSEE.

THE GOVERNOR

Is elected by the people biennially, and is not eligible for more than six years in any term of eight years. He must have attained the age of thirty years, and must be a citizen of the United States, and a citizen of the State seven years next preceding his election.

THE LEGISLATIVE POWER

Is vested in a Senate and House of Representatives, which are styled the General Assembly.

THE SENATE

Consists of twenty-five members, elected by the people once in two years. Every Senator must have attained the age of thirty years, and must be a citizen of the United States, and an inhabitant of the State three years, and of the district for which he is elected one year immediately preceding his election.

THE HOUSE OF REPRESENTATIVES

Consists of seventy-five members, elected at the same time and for the same period as the Senators. Every representative must be a citizen of the United States, of the age of twenty-one years, a citizen of the State three years, and a resident in the county he represents one year immediately preceding his election.

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The Judiciary Power.

All Judges are elected by joint vote of the General Assembly. The Judges of the Supreme Courts are elected for twelve years, and must have attained the age of thirty-five years. The Judges of the Inferior Courts are elected for eight years, and must have attained the age of thirty years. The State Attorneys are elected in like manner. Their term of service is six years.

Secretary and Treasurer.

The Secretary of State and the State Treasurer are elected by joint vote of the General Assembly, the former for four, and the latter for two years.

Right of Suffrage.

Every free white man of the age of twenty-one years, being a citizen of the United States, and a citizen of the county where he may offer his vote, six months next preceding the day of election, is entitled to vote; but no person is disqualified from voting on account of colour, who is by the laws of the State a competent witness in a court of justice against a white man.

Election, &c.

The election is held on the first Thursday of August biennially. The next election will take place on the first Thursday of August, 1845. The General Assembly meet biennially at Nashville on the first Monday of October. The next meeting of the Assembly will be in 1845.

	Salary.
Governor, James C. Jones,	$2,000
Secretary of State, John S. Young, ...fees and	750
Treasurer, Miller Francis,	1,500
Comptroller, Daniel Graham,	2,000
Attorney-General, West H. Humphreys, ...fees and	1,000
Speaker of the Senate, Josiah M. Anderson.	
Speaker of the House of Representatives, Daniel L. Barrenger.	

Supreme Court.

Judge Eastern District,	William B. Reese,	1,800
" Middle "	Nathan Greene,	1,800
" Western "	W. B. Turley,	1,800

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KENTUCKY.

The Governor

Is elected once in four years by the people, and is ineligible for the next seven years thereafter. He must be at least thirty-five years of age, and a citizen of the United States. He must also have been a resident of the State at least six years next preceding his election.

The Lieutenant-Governor

Is elected at the same time, in the same manner, holds his office during the same period, and must possess the same qualifications as the Governor. He acts as Governor in case of death, removal, impeachment, resignation, absence of that officer, or his refusal to serve. As Lieutenant-Governor, he presides in the Senate.

The Legislative Power

Is vested in two distinct branches, the Senate and House of Representatives, which together are styled the General Assembly of the Commonwealth of Kentucky.

The Senate

Consists of thirty-eight members, citizens of the United States, at least thirty-five years of age. The Senators are elected by the people for the term of four years, one-fourth of the number being elected annually. Every Senator must have been a resident of the State six years, and during the last year a resident of the district for which he is elected.

The House of Representatives

Consists of one hundred members, citizens of the United States, at least twenty-four years of age, elected annually by the people. Every representative must have resided in the State two years next preceding his election, and during the last year in the county or town for which he is elected.

The Judiciary Power.

All Judges are appointed by the Governor, with the advice and consent of the Senate. They hold their offices during good behaviour.

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Right of Suffrage.

Every free male citizen, (negroes, mulattoes, and Indians excepted,) twenty-one years of age, who has been resident in the State two years, or in the county or town where he offers his vote, one year, enjoys the right of an elector.

Election, &c.

The annual election takes place on the first Monday of August. At the request of any candidate the polls may continue open three days. In all elections by the people, and also by the General Assembly, the votes must be personally and publicly given, *viva voce*. The General Assembly meet at Frankfort on the first Monday of December annually.

	Salary.
Governor, William Owsley,	$2,500
Lieutenant-Governor, Archibald Dixon, during session of Senate per day, $6.	
Secretary of State, James Harlan,	750
Treasurer, James Davidson,	1,250
Auditor, Benjamin Selby,	1,250
Attorney-General, Owen G. Cates, fees and	300
Speaker of the House of Representatives, John L. Helm, (1843–4,) $4 per day.	

Court of Appeals.

Chief Justice,	Ephraim M. Ewing,	$1,500
Judge,	Daniel Breck,	1,500
"	Thomas A. Marshall,	1,500
Reporter,	Benjamin Monroe.	

Louisville Chancery Court.

Chancellor,	S. S. Nicholas,	2,000

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OHIO.

The Governor

Is elected biennially by the people. He is not eligible for more than six years in any term of eight years. He must have been a citizen of the United States twelve years, an inhabitant of the State four years next preceding his election, and must be at least thirty years of age.

The Legislative Power

Is vested in a Senate and House of Representatives, which together are styled the General Assembly.

The Senate

Consists of thirty-six members, citizens of the United States, at least thirty years of age, chosen biennially by the people, one-half the number being elected annually. Every Senator must have resided in the county or district from which he is elected two years immediately preceding his election, and must also have paid a State or county tax.

The House of Representatives

Consists of seventy-two members, citizens of the United States, at least twenty-five years of age, elected annually by the people. Every representative must be an inhabitant of the State, must have resided in the county from which he is elected one year next preceding the election, and must also have paid a State or county tax.

The Judiciary Power.

The Judges of the Supreme Court, the Presidents and Associate Judges of the Courts of Common Pleas, are appointed by joint vote of the General Assembly, and hold their offices for seven years.

Secretary, Treasurer, &c.

The Secretary of State, Treasurer, and Auditor, are appointed by joint vote of the General Assembly, and are elected for three years.

Right of Suffrage.

All white male inhabitants above the age of twenty-one years, who have resided in the State one year next preceding the election, and have paid, or are charged with, a State or county tax, enjoy the right of voting.

Election, &c.

The annual election is held on the second Tuesday of October. The General Assembly meets at Columbus on the first Monday of December annually.

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		Salary.
Governor,	THOMAS W. BARTLEY, (acting.)	$1,500
Secretary of State,	Samuel Galloway,	1,000
State Treasurer,	Joseph Whitehill,	1,200
Auditor,	John Brough,	1,200
Speaker of the Senate,	(Acting as Governor.)	
Speaker of the House,	John M. Gallagher, (1843–4.)	

SUPREME COURT.

Chief Justice,	Ebenezer Lane,	1,500
Associate "	Matthew Burchard,	1,500
" "	Reuben Wood,	1,500
" "	Nathaniel C. Reed,	1,500
Reporter,	Edwin M. Stanton.	

INDIANA.

THE GOVERNOR

Is elected once in three years by the people. He is ineligible for more than six years in any term of nine years. He must have attained the age of thirty, must have been a citizen of the United States for ten years, and must have resided in the State five years next preceding his election.

THE LIEUTENANT GOVERNOR

Is elected at the same time, in the same manner, for the same length of time, and must possess the same qualifications as the Governor. He is President of the Senate, and acts as Governor in the event of that officer's death, impeachment, resignation, refusal to serve, or absence.

THE LEGISLATIVE POWER

Is vested in a Senate and House of Representatives, which together are styled the General Assembly.

THE SENATE

Consists of fifty members, citizens of the United States, at least twenty-five years of age, elected by the people for three years, one-third of the number being elected annually. Every Senator must have been a resident in the State two years, and in the county or district for which he is elected, one year immediately preceding the election. He must also have paid a State or county tax.

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The House of Representatives

Contains one hundred members, citizens of the United States, at least twenty-one years of age, elected annually by the people. Every representative must be an inhabitant of the State, and must also have resided in the county for which he is elected, one year preceding the election, and have paid a State or County tax.

The Judiciary Power.

The Judges of the Supreme Court are appointed by the Governor, with the advice and consent of the Senate, and hold their appointments for the term of seven years. The Presidents of the Circuit Courts are appointed by joint ballot of the General Assembly; the Associate Judges are elected by the people, each county electing its own Associate only. These officers hold their stations for the term of seven years.

Secretary, Treasurer, and Auditor.

The Secretary of State, Treasurer, and Auditor, are elected by joint ballot of the General Assembly. The Secretary holds his office four years; the Treasurer and Auditor each three years.

Right of Suffrage.

Every white male citizen of the United States, of the age of twenty-one years and upwards, who has resided in the State one year immediately preceding the election, is entitled to vote.

Election, &c.

The annual election is held on the first Monday of August. The General Assembly meets annually at Indianapolis on the first Monday of December.

	Salary.
Governor, James Whitcomb,	$1,500
Lieutenant-Governor, Jesse D. Bright, during session of Senate, $3 per day.	
Secretary of State, William Sheets,	800
Treasurer, George H. Dunn,	1,000
Auditor, Morris Morris,	1,000
Speaker of the House of Representatives, A. L. Robinson, (1843–4.)	

Supreme Court.

Chief Justice,	Isaac Blackford,	1,500
Associate, "	Jeremiah Sullivan,	1,500
" "	Charles Dewey,	1,500

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ILLINOIS.

The Governor

Is elected by the people once in four years, and is ineligible for more than four years in any term of eight years. He must be at least thirty years of age, and must have been a citizen of the United States thirty years, and resident within the limits of the State two years next preceding his election.

The Lieutenant Governor

Is elected at the same time, in the same manner, and must possess the same qualifications. He is Speaker of the Senate, has a voice and vote on all subjects, and acts as Governor in the event of that officer's death, impeachment, resignation, or absence from the State.

The Legislative Power

Is vested in two distinct branches, the Senate and House of Representatives, which together are styled the General Assembly.

The Senate

Consists of 39 members, citizens of the United States, at least twenty-five years of age, elected by the people once in four years, one-half being elected biennially. Every Senator must have resided one year in the county or district for which he is elected, and must have paid a State or county tax.

The House of Representatives

Consists of 106 members citizens of the United States, at least twenty-one years of age, elected once in two years by the people. Every representative must be an inhabitant of the State, and must have resided within the district or county for which he is elected at least twelve months preceding the election.

The Judiciary Power.

The Judges of the Supreme Court and of the Inferior Courts are appointed by joint vote of the General Assembly, and hold their offices during good behaviour.

Secretary and Treasurer.

The Secretary of State is appointed by the Governor, with the advice and consent of the Senate. The State Treasurer is appointed biennially by the joint vote of the General Assembly.

Right of Suffrage.

All white male inhabitants, above the age of twenty-one years, who have resided in the State six months next preceding the election, are entitled to vote in the county or district in which they actually reside at the time of election.

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Election, &c.

The election takes place on the first Monday of August biennially. The next election will be in 1846. The General Assembly meet biennially at Springfield on the first Monday of December. The next meeting will be in December 1844.

	Salary.
Governor, Thomas Ford,	$2,000
Lieutenant-Governor, John Moore, during session of Legislature, $6 per day.	
Secretary of State, Thompson Campbell,	1,500
Treasurer, Milton Carpenter,	1,6[illegible]0
Auditor, William L. D. Ewing,	1,850
Attorney-General, ——— M'Dougal, fees and	700
Speaker of the House of Representatives, Samuel Hackleton, (1842–3.)	

Supreme Court.

Chief Justice,	William Wilson,	$1,500
Associate "	Samuel H. Treat,	1,500
" "	Thomas C. Browne,	1,500
" "	Walter B. Scates,	1,500
" "	John D. Caton,	1,500
" "	Samuel D. Lockwood,	1,500
" "	James Shields,	1,500
" "	Richard M. Young,	1,500
" "	Jesse B. Thomas,	1,500

Reporter, ...J. Young Scammon.

TRADE OF CHICAGO, ILLINOIS.

	Exports.		Imports.	
1836	$1,000	64	$325,203	90
1837	11,065	00	373,667	12
1838	16,042	75	579,174	61
1839	33,843	00	630,980	26
1840	228,635	74	562,106	26
1841	348,262	24	564,347	88
1842	659,305	20	664,347	88
1843	1,008,207	00	1,443,886	00

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MISSOURI.

The Governor

Is elected once in four years by the people. He must be at least thirty-five years of age, and a natural-born citizen of the United States. He must also have been a resident of the State at least four years next preceding his election, and is ineligible for the next four years after the expiration of his term.

The Lieutenant-Governor

Is elected at the same time, in the same manner, and must possess the same qualifications as the Governor. He is President of the Senate; in committee of the whole he may debate on all questions; and when there is an equal division in the Senate or in joint vote of both Houses, he gives the casting vote. He acts as Governor when that office becomes vacant by death, resignation, removal from office or otherwise, until the office is filled.

The Legislative Power

Is vested in a General Assembly, which consists of a Senate and House of Representatives.

The Senate

Consists of thirty-two members, free white male citizens of the United States, at least thirty years of age, elected by the people for four years, one-half of the number being elected biennially. Every Senator must have been an inhabitant of the State four years preceding his election, and of the district which he represents one year before his election. He must also have paid a State or county tax.

The House of Representatives

Consists of 100 members, free white male citizens of the United States, at least twenty-four years of age, elected biennially by the people. Every representative must have been an inhabitant of the State two years immediately preceding his election, and of the county which he represents one year before the election, and must also have paid a State or county tax.

The Judiciary Power.

The Governor, with the advice and consent of the Senate, appoints the Judges of the Superior and Inferior Courts, and the Chancellor, who hold their offices during good behaviour. No person can be appointed to either of these posts until he shall have attained the age of thirty years, or exercise the duties after he shall have attained the age of sixty-five years.

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Secretary, Treasurer, &c.

The Secretary of State is appointed by the Governor, with the advice and consent of the Senate, and holds his office four years. The Treasurer is elected by joint vote of the General Assembly biennially. The Auditor of Public Accounts is appointed in the same manner, and holds his office for the same length of time, as the Secretary of State

Right of Suffrage.

Every free white male citizen, of the age of twenty-one years and upwards, who has been resident in the State one year before an election, the last three months of this period in the district in which he offers his vote, is deemed a qualified elector.

Election, &c.

The General Election is held biennially on the first Monday of August. The General Assembly meet biennially at Jefferson City on the fourth Monday of November. The next election and meeting of the General Assembly will be in 1846.

		Salary.
Governor, M. M. Marmaduke, (acting,)		$2,000
John C. Edwards, (from November 1844.)		
Lieutenant-Governor. James Young, (from November 1844,)		
Secretary of State, James L. Minor,	fees and	1,300
State Treasurer, Peter G. Glover,		1,450
Auditor, Hiram H. Baber,		1,700
Attorney-General, Samuel M. Bay,	fees and	800

Supreme Court.

Chief Justice,	George Tompkins,	$1,100
Associate "	William Scott,	1,100
" "	William B. Napton,	1,100

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MICHIGAN.

The Governor

Is elected once in two years by the people. He must have been a citizen of the United States five years, and a resident of the State two years next preceding his election.

The Lieutenant-Governor

Is elected for the same time, and in the same manner, and must possess the same qualifications. He is President of the Senate, in committee of the whole may debate on all questions, and when there is an equal division, may give the casting vote. He acts as Governor in the event of that officer's decease, impeachment, resignation or absence.

The Legislative Power

Is vested in a Senate and House of Representatives.

The Senate

Consists of eighteen members, elected by the people for two years, one-half of the number being elected annually. Senators must be citizens of the United States, and qualified electors in the respective counties and districts which they represent; a removal from which is deemed a vacation of their seats.

The House of Representatives

Consists of fifty-four members, elected annually by the people. The requisite qualifications of Representatives are similar to those of Senators.

The Judiciary Power.

The Judges of the Supreme Court are appointed by the Governor, with the advice and consent of the Senate, and hold their offices seven years. Judges of all County Courts, Associate Judges of Circuit Courts, and Judges of Probate, are elected by the qualified electors of the county in which they reside, and hold their offices four years.

Secretary, Treasurer, &c.

The Secretary of State is appointed by the Governor, with the advice and consent of the Senate, and holds his office two years. The Treasurer is appointed by joint vote of the Legislature, and holds his office two years.

The Auditor-General, Attorney-General, and a Prosecuting Attorney for each county, are appoiuted in same manner as the Secretary of State. They also hold their offices for the term of two years.

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Right of Suffrage.

Every white male citizen above the age of twenty-one years, who has resided in the State six months preceding any election, is entitled to vote at such election, in the district, county, or township in which he resides.

Election, &c.

The General Election takes place annually on the first Monday of November. The Legislature meets annually at Detroit on the first Monday of January.

		Salary.
Governor,	John S. Barry,	$1,500
Lieutenant-Governor,	Origen D. Richardson, during session of Legislature, per day, $6.	
Secretary of State,	Robert P. Eldredge,	1,000
Treasurer,	John J. Adam,	1,000
Auditor,	Charles G. Hammond,	1,000
Attorney-General,	Elon Farnsworth,	fees and 500

President of the Senate, *pro. tem.* Edwin M. Cust.
Speaker of the House of Representatives, (1844,) Edwin H. Lothrop.

Supreme Court.

Chief Justice,	Epaphroditus Ransom,	$1,600
Associate "	Charles W. Whipple,	1,500
" "	Alpheus Felch,	1,500
" "	Daniel Goodwin,	1,500

Court of Chancery.

Chancellor,	Randolph Manning,	1,500

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TERRITORIAL GOVERNMENTS.

The Governors of Territories

Are appointed by the President of the United States, with the advice and consent of the Senate, for the term of three years.

The Legislative Power

Is vested in Legislative assemblies, each consisting of a Council and a House of Representatives, elected by the people of the respective Territories.

The Judicial Power.

The Judges of the respective Territories are appointed by the President and Senate, and hold their offices during the period of four years.

Secretaries, Treasurers, &c.

A Secretary is appointed for each Territory, by the President and Senate, for the term of four years. He acts as Governor, in case of a vacancy in that office, until such vacancy be filled. The Treasurers and Auditors are elected by joint vote of the Legislative assemblies.

FLORIDA TERRITORY.

		Salary.
Governor,	John Branch,	$2,500
Secretary,	Thomas H. Duvall,	1,500
Treasurer,	Thomas H. Austin.	

Judiciary.

Districts.	Judges.	
Eastern,	Isaac H. Bronson,	2,300
Middle,	Samuel J. Douglass,	1,800
Southern,	William Marvin,	1,800
Western,	Dillon Jordan, Jr.	1,800
Apalachicola,	Samuel W. Carmack,	1,800

WISKONSAN TERRITORY.

		Salary.
Governor,	Nathaniel P. Tallmadge,	$2,500
Secretary,	George Floyd,	1,200
Treasurer,	James Morrison,	60
Auditor,	Julius T. Clark,	60
Attorney-General,	Mortimer M. Jackson,	fees.

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Supreme Court

Chief Justice,	Charles Dunn,	1,800
Associate "	David Irvine,	1,800
" "	Andrew G. Miller,	1,800

IOWA TERRITORY.

		Salary.
Governor,	John Chambers,	$2,500
Secretary,	Samuel J. Burr,	1,200
Treasurer and Librarian,	Morgan Reno,	210
Auditor,	William L. Gilbert,	100

Supreme Court.

Chief Justice,	Charles Mason,	1,800
Associate "	Thomas S. Wilson,	1,800
" "	Joseph Williams,	1,800

(Delegates have been elected (August, 1844,) to a Convention to form a State Constitution for this Territory, preparatory to its admission into the Union.)

DISTRICT OF COLUMBIA.

Judiciary.

United States Circuit Court.

		Salary.
Chief Justice,	William Cranch,	$2,700
Associate "	Buckner Thruston,	2,500
" "	James S. Morsel,	2,500

Orphans' Court.

Washington county, Judge,	Nathaniel P. Causin,	1,000
Alexandria " "	Christopher Neal,	1,000

Criminal Court.

Judge,	James Dunlop,	2,000

(The Judges in the District of Columbia are appointed by the President of the United States, with the advice and consent of the Senate, and hold their offices during good behaviour.)

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ADDENDA.

THE following appointments have been made since the portions of the Almanac, to which they have reference, passed through the press.

Page 3.—*John A. Bryan*, Chargé d'Affaires to Peru, in place of J. C. Pickett.

CONSULS.

Page 5.—*Gabriel G. Fleurot*, Martinique.
" " *Isidore Guillet*, (Commercial Agent,) St. Thomas.
" " *Samuel M'Lean*, Trinidad de Cuba.
" " *Franklin Lippincott*, Cien Fuegos, Cuba, in place of Samuel M'Lean, transferred to Trinidad de Cuba.
Page 6.—*Alexander Tod*, Alexandria, Egypt, in place of John Gliddon, deceased.
" " *John B. Williams*, (Commercial Agent,) Feejee Islands.
" " *Eneas M'Faul*, Laguna, Mexico, in place of L. R. Almy, resigned.

UNITED STATES ATTORNEY.

Page 56.—*Thomas D. Mosely*, for the Middle District of Tennessee, in place of John M. Lea, resigned.

UNITED STATES MARSHALS.

Page 57.—*Robert C. Ewing*, for Missouri, in place of W. C. Anderson, who declined the appointment.
" " *Charles M. Prevost*, for Wiskonsan Territory.

UNITED STATES DISTRICT COURTS.

Page 58.—The following alterations are to be made:
New Jersey.—District Court meets at Trenton, in place of New Brunswick and Burlington.
Virginia, (*E. District.*)—For 1st of May, read 30th of May.
Virginia, (*W. District.*)—Read "Clarksburg," last Mondays of March and August—"Wheeling," Wednesdays after 1st Mondays of April and September.
Page 59.—*Ohio*—For "Cincinnati" read "Columbus."
Page 174.—*North Carolina*—David P. Caldwell has been appointed to fill the vacancy in the Superior Court. Salary $1,950.

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